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THE AMERICAN GAS LIGHT JOURNAL

REDMAN & KENNY, N.Y.

PUBLISHING OFFICE No. 42 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, VENTILATION, WATER SUPPLY AND DISTRIBUTION, & GENERAL SCIENCE.

VOLUME XLV.—No. 3. Whole No. 651. | NEW YORK, MONDAY, AUGUST 2, 1886. | $3 PER ANNUM IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. E. SANDERSON, Manager.
JOS. R. THOMAS, C.E., Editor.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS SECOND CLASS MATTER.

Published on the 2d and 16th of each month, at No. 42 Pine Street, N. Y.

Terms of Subscription, Including Postage.—For the United States and Canada, $3 per annum. European countries, $3.50 (15 shillings—18 francs). All payments to be made in advance. Single copies, 15 cents.

Remittances should be made either by post-office order, registered letter, or bank draft on New York, payable to the order of A. M. Callender & Co.

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[OFFICIAL NOTICE.]

The Fourteenth Annual Meeting of the American Gas Light Association.

AMERICAN GAS LIGHT ASSOCIATION,
July 23, 1886.

To the Members of the Association:

I am desirous of impressing upon the members of the Association that but a few weeks remain before the assembling of our Fourteenth Annual Convention, and that if we wish to make the coming meeting equal in interest and value to its predecessors, it is necessary that we all—officers, committeemen and members—should be working heartily and persistently toward that desirable end. The members do not need to be reminded that the Association, at its last meeting, decided that the Fourteenth Annual Convention should be held in the city of Brotherly Love, and it will be the unanimous opinion of all that a more desirable selection could not have been made. While it is not possible, at this early date, to state what arrangements will be made for the accommodation of the members during their stay in Philadelphia, I can assure all hands that the members of the committee have not been idle—a statement which will be generally agreed to when the twentieth of October arrives.

It was hoped that in connection with our Fourteenth Annual Convention it would be possible—working in conjunction with the Franklin Institute—to have an exhibition of gas appliances; but as the Institute will not hold an exhibition the present year, this idea will have to be abandoned, at least for the present.

As I have already remarked, the officers and committees are not resting idly, but are striving to make our coming meeting a pleasant and profitable one; but this much-desired end cannot be attained without the active co-operation of all the members, and it is this fact which I am anxious to bring home to the members at the present time. It is not necessary that I should repeat what has been said to the members in the circulars issued last year and the year before; suffice it that I remind the members that it has been pointed out that the success of these annual conventions is something which each individual member is responsible for. As in the affairs of State, a citizen cannot escape the responsibilities of citizenship, simply because he is one of thousands; no more can a member of a technical society get away from the duty which rests upon him to do all that lays in his power to advance its interests. Each person has some information which would be of value to his professional brethren; and if, in his judgment, it is not of sufficient importance to justify its use as a theme for a paper, the facts or figures can at least be put in shape, so that, if occasion offers, use can be made of them in the discussion of some other paper. Secretaries of technical societies who have year after year to strive to secure a sufficiency of papers for the annual meetings are continually met with the remark that there is nothing new to write upon; but really this is an incorrect statement; for while there may not be any new or startling discovery to chronicle, yet it is possible to find something new in every old subject. Is there anyone so bold as to say that the thousand-and-one subjects which have been discussed at the various gas managers' meetings during the last ten years have been settled finally and decisively, so there is nothing more to be said on the matter? Hardly could anyone be so rash as to make such a statement. Circumstances alter cases; and as the circumstances of to-day are different from those of yesterday, it must be clear and patent that we cannot consider any of the many complex questions that arise in our business as settled for once and forever. In fact we could take up any of the apparently threadbare subjects which have been discussed from time to time, and find something new in connection with the matter, or be able to place the theme in a novel aspect. To cite one example—take the case of tar as fuel. One would suppose that, during the many years this matter has been under discussion, it had been pretty well screened of all valuable information; yet we find that the subject has formed a leading theme for consideration during the last few months in the foreign gas journals. Many other cases might be noted, but this is sufficient to prove that there are few subjects which have been settled for time and eternity. Therefore, if a member can be brought to a sense of his responsibility, and be made to feel that the burden of part of the literary portion of the programme rests on him, he will not be long in finding a

theme under which his duty can be discharged. As last year, so again now, I would urge the importance of having a list of the subjects to be discussed at our coming meeting published well in advance, so that all may come prepared to participate in the discussions.

If anyone has a lingering doubt remaining of the wisdom of publishing in advance the titles of the papers to be read at our annual meetings let him turn to the discussions which took place last fall at Cincinnati, the perusal of which ought to convince him that when members know in advance the topics to be discussed they come prepared to speak by the book and not from memory. Therefore, in making this appeal for papers I am very earnest in my request that members will give the matter their early attention, so I may have, early in September, a list of the papers to be read in October.

As last year, so again now, I would say if a member has any question he would like to have discussed at the coming meeting, and will kindly address me on the subject, I will embrace it in the list of my themes to be considered. C. J. R. Humphreys, Sec'y.

P. O. Box 6, Lawrence, Mass.

PAWTUCKET, R. I., IN COMMOTION.

Pawtucket is not looked upon as being an extra Quaker-like town, and hence it is reasonable to suppose the ordinary commotions that will make themselves occasionally or often felt in thriving business centers are accepted as common if not everyday matters in Pawtucket as in other like localities. Your everyday disturbance, however, is not as a rule well calculated to harden those who dwell within the disturbed area up to the notch of receiving an extraordinary shock with an equanimity equal to that with which they receive the lesser ills. On the afternoon of Friday, July 16, Pawtucket was sleepily endeavoring to drone away the hour or so which separated its residents from the expected cooling breezes of the early evening, and no outward or visible token of coming disaster was manifested. However, it is but a second between safety and danger, and, "the hour being ripe," at 3 P.M. on the day noted the danger second burst out—so did the glass in the shop windows, and in the street cars as well. The curbstones moved uneasily in their beds, the street pavements quaked as though possessed of an evil spirit, and the manhole covers to the sewer drains absolutely danced like demons. Not only did they dance, but their terpsichorean effort was heightened by an accompaniment of misty blue flashes, the "effect" being augmented by a series of explosions which would delight the heart of that Nestor of brass band leaders—the only Gilmore—could he but induce his "anvil men" to imitate them. And what caused all this pandemonium? There could not be any doubt that the whole thing was traceable to the city's drains; the evidence was conclusive and irrefutable. Still, an ordinarily well-behaved drain may be counted on to keep its place and distance, and the frightened burghers, who at Pawtucket as elsewhere are ever ready to accuse the gas man, with one accord charged the disaster to the account of Brother Stiness's Pawtucket gas works. Having reached that sapient conclusion, the telephone swiftly conveyed an order to the gas works men to shut off the gas, and to stop making gas holders out of the sewer drains. Although Mr. Stiness (who at the time was at his post of duty) is not rated as an "unbeliever," he was, "on this occasion," strongly tempted to backslide. With a celerity of movement which would do credit to one of Brother Harbison's colts, the Pawtucket gas man, armed with a wrench, entered his buggy and hied off to the scene of disaster. Once within the affected district he called a halt at the first manhole, and thereover sniffed, with the air of an expert, at the ascending vapors. One sniff was sufficient to furnish the proper clue—it was gas, to be sure; but not the orthodox Pawtucket description or sort. Diving further into the district, Mr. Stiness encountered City Engineer Wilkinson, who repeated that the Pawtucket Gas Company was responsible for the disaster. This was negatived by Mr. Stiness, and the engineer's query, "What is it, then?" was responded to in the answer, "Naphtha." That was supplemented by the suggestion that the naphtha came from the works of the Union Wadding Company, which establishment uses large quantities of that volatile liquid. This suggestion took on great color of truth when it was learned that a private drain from the Wadding Company's works led into the main sewer along the line of which the explosions had been most violent. Next day Mr. Stearns, Supt. of the suspected establishment, prepared a card for publication in the evening papers of the same date, but before the evening journals went to press it was proven beyond doubt that Mr. Stiness had been right in his surmises. Certain of the city officials went to a sewer pocket located on the drain of the Wadding Company, and dipped out a bucketful of the drip. A naked light was applied to the surface of the bucket, and the result was a slight explosion, succeeded by an intensely hot, blue flame. The question next to be considered is the reimbursement of those who suffered from the effects of the Wadding Company's policy; but however that question may be ultimately settled, we suppose Mr. Stiness is satisfied over the facts as developed, and is quite contented at the poor measure of success gained by those who sought to connect the Pawtucket Gas Company with the memorable upheaval of July 16th.

In passing, and to speak seriously, the officials of Long Island City, in this State, may be treated to a duplication of the Pawtucket experience. In fact they at divers times have had several more or less ungentle reminders of the dangerous condition of things in their sewer drains, which in reality seem to serve but as the vehicle through which the local petroleum oil refiners may most easily dispose of the refuse from their stills.

PAYING FOR THEIR PARSIMONY.

Boston is said to take great pride in her hotels; in fact often "points with pride" to their many excellencies; and the Hotel Brunswick has hitherto been conceded to stand pretty near the top of the list. But as "pride goeth before a fall," it is perhaps not to be wondered at that the Brunswick is not in such high favor as formerly with the curled darlings who were wont to congregate within its hospitable recesses—and on account of a very simple thing. Mr. Barnes and some of the other owners of the Brunswick not long since determined that their gas meters were not giving proper registration, or rather were doing altogether too much registration, and while they were in that frame of mind along came a certain Mr. W. W. Billings, who posed as the inventor of a naphtha or gasoline gas manufacturing process. The inventor succeeded finally in inducing the hotel men to put in one of his machines, and in due course the click of the gas meter, and the rage of the cashier over the receipt of the monthly reminders from the gas companies as well, became only misty memories of the troublesome past. It is true the guests often complained that the light acted queerly and occasionally smelled badly, but the hotel men said naught, and inventor Billings preserved a discreet silence—at least he made no positive sign until the evening of July eighth. On that occasion policeman Marston, while patrolling Boylston street, in the neighborhood of the Museum of Natural History, was astonished at hearing the report of a sharp explosion. A glance up the street revealed a badly frightened mob of domestics who had rushed out of the Hotel Brunswick, and appealed to Marston for aid. He passed through the billiard room and out into a basement apartment in rear of the hotel. This apartment was filled with smoke and steam, and the flames had already seized hold of the woodwork. Marston found inventor Billings endeavoring to put out the fire, and the latter begged the officer not to send out an alarm of fire on account of the fact "that it was his invention that was on trial, that one of the gasoline reservoirs had exploded, and if it became generally known his business would be completely ruined." Not bad for an inventor who would seek to jeopardize the lives of the hotel inmates simply because he was afraid his business would be ruined! However, policeman Marston brought out the engines, and when the latter arrived on the scene Mr. Barnes would not allow the firemen to enter. He even barred the door of the burning apartment so strongly that the fire laddies had to break the barricade with their axes. The flames were speedily quelled, and while the loss was not heavy it is nevertheless large enough to have kept the Brunswick in a good supply of illuminating gas for months. Such parsimony is ridiculous, and, in the long run, is sure to wind up in a thorough exemplification of the poor policy of being penny-wise and pound-foolish. Perhaps the Brunswick's guests may not be over anxious to rest any longer in close proximity to inventor Billings' lively gas making apparatus.

A Correction.

In our reprint of the discussion on the Majority and Minority Reports presented to the Western Gas Association at its late meeting in Columbus, Ohio, on the matter of State Gas Commissions, we find that Mr. John McIlhenny's remarks were somewhat garbled. On page 35, col. 2, lines 14–15, he is reported as having said:

"We know that the history of gas companies in this country has been a history of speculation;" but in reality the speaker employed the words, "We know that the history of *opposition* gas companies has been," etc.

In same column, lines 22 and 23, he is recorded as asserting the following:

"If placed at ten dollars per thousand I think no objection could be found;" and that entirely misrepresented the speaker's position in regard to the question. The true rendition of his words is appended:

"Ten dollars per thousand *would be altogether too much, and would not do at all.*"

When we mentioned the fact of the death of the late Peter Munzinger, who for so many years had been in charge of the manufacturing establishment of Morris, Tasker & Co., of Phila., Pa., we promised to subsequently give some account of his life. We have endeavored to collect the particulars, but those secured are so meager that their publication would not serve any useful purpose.

[Official Report—Continued from page 40.]

Ninth Annual Meeting of the Western Gas Association.

Held at the Neil House, Columbus, Ohio, May 12 and 13, 1886.

Second Day—Afternoon Session—Thursday, May 13.

Committee of Arrangements, '87 Meeting.

The President appointed Messrs. J. D. Thompson, T. G. Lansden, and D. R. Russell a Committee of Arrangements to manage details in connection with the Tenth Annual Meeting, to be held next year in St. Louis, Mo.

Report of Treasurer.

Treasurer Littleton submitted the following annual report:

Receipts.

To balance from 1885	$258 50	
" annual dues	416 00	
" initiation fees	175 00	
		$849 50

Expenditures.

By Secretary's salary	$250 00	
" disbursements on account of Ninth Annual Meeting, as per statement rendered, up to May 1	299 00	
		$549 00
Balance on hand May 1, 1885		300 50
Total		$849 50

Report of Auditing Committee.

The Committee on Treasurer's Accounts presented the following report:

Your Committee, appointed to examine the books and vouchers of the Treasurer, beg leave to report that the accounts of that official are in proper order, and duly authenticated. We also find there are 18 members who are three years in arrears for dues. We recommend that the Secretary be instructed to notify them of their arrearages, the notification to state that if a settlement of the back dues be not made prior to the next annual meeting the names of delinquents shall be dropped from the roll.

Respectfully submitted,

E. J. King,
Thos. Smith,
G. G. Ramsdell, } Committee.

Both reports were received, adopted, and placed on file.

Reading of papers was then resumed. Mr. B. E. Chollar, of Topeka, Kansas, occupied the attention of the Association by reading the following paper, entitled,

GAS BURNERS AND GAS ILLUMINATION.

From a gas manufacturer's point of view, it would appear that the promoters of electric lighting, at least in regard to the matter of the measurement of their light, have managed to completely and thoroughly impale themselves upon both horns of a full-grown dilemma. For a considerable time the "only, greatest light of the future" cast its effulgence of 2,000 candle power without question or dispute. How or by what means that enormous figure was secured, or why it should happen to come up exactly and precisely to that nice, round period ending with three figures, are questions more easy to ask than to answer. It is possible, however, that the "future great light" may have been intended ultimately for illuminating the world from a cross-roads at the North Pole, from which point, of course, all "horizontal directions" are due south.

If, therefore, the "future great light" can cast a light of 400 candle power in four different directions, all of these being due south, it follows, as a logical(?) conclusion, that all of them must be in the same direction, and, as a consequence, the united result is equivalent to 1,600 candles in one direction. To this must be added another 400 candles, which would "shine directly down the Pole;" thus completing the required and desired 2,000 candle power.

If the incandescent system had not materialized it would have been equally the same whether the "future great" had been rated at an illuminating value of 2,000 or 20,000 candles. The public would have understood just the same—that is to say, they would have known nothing at all about it in either case. But the incandescent plan did materialize; and the sickly 8-candle glimmer of the average and everyday incandescent sample cuts but a sorry figure when compared with the magnificent appearance of its big relative, which acts on what might be termed the "effervescent" system. Yet the style in which the "little ones" get away with the "ergs" is little short of an eye-opener. Half a dozen of them, at 8 candles each, absorb as much energy as one of the big fellows rated to develop 2,000 candles.

One way to smooth over this great disparity is to take a first-class sample of a new incandescent lamp, send through it a current of about twice as many "amperes" as will ever "appear" in it again, and then compare it with the very worst gas light that can be found. Under this style of procedure the gas can be figured down to about 8 candles, while the "future great junior" will "volt" up to 16; and, "ohm" (y), what a beautiful light it is! Of course, there still remains the enormous difference between the range of the two electric luminaries; but as the difference between the gas light and the arc light is caused to appear to be twice as great, there results immense consolation to the "knight of the dynamo."

Ridiculous as the foregoing may seem to sound, it is nevertheless substantially a correct showing or illustration of the manner in which the electric light people "bull" their own goods and "bear" those of the gas companies. In proof of the truth of this statement I beg to call your attention to the following:

In a late report of the authorities of the city of Munich, Germany, upon the present condition of electric lighting, Dr. Schilling quotes the following from a similar report made by Dr. Hajan to the city government of Berlin: "The price of the incandescent light, to which the Edison Company calls attention, is about the same as that of illuminating gas, but only on condition that, in order to obtain the same intensity of light as by an Edison 16-candle light, it is necessary to burn 7.25 cubic feet of gas per hour. This estimate is, however, in general, as well as for the New York factories, not at all correct." * * * "In most American publications where comparisons are made between the cost of electricity and gas light, we always see the price of an Edison 16-candle lamp placed beside an 8-candle gas light. Here lies a mistake, for every gas expert knows that the relative proportions between the consumption of gas and the light produced are not the same in large and small flames, and that the effect is relatively much more unfavorable when little gas is consumed than when much is used. Two gas flames of 8 (nominal) candle power are less economical than one 16-candle gas flame."

It is quite probable, therefore, that the Edison people, in their search after gas burners with which to compare their light, have taken good care to select those best calculated to develop as small a volume of light as possible in proportion to the quantity of gas consumed.

The following experiments were made for the purpose of determining the relative intensity of light developed by ordinary flat-flame burners of various sizes, and at varying rates of consumption. The burner employed as a standard was a Sugg's London, No. 1, with 24 holes. The chimney was 6 inches in length and 1¼ inches in diameter. It was regulated to consume 5 cubic feet per hour. In case of any departure or variation from the exact rate, the proper correction was made. The average illuminating power of the gas throughout the experiment was 17.90 candles; corrected to 30 inches barometer and 60° F. temperature. The light developed by this standard burner was assumed to be 100, and the consumption of gas was also placed at 100; or, in other words, one dollar's worth of gas was supposed to give one dollar's worth of light, independent of any actual selling price of the gas.

The first column of figures in the table gives the numbers representing the sizes of the burners; the second, the rate of consumption of gas; and the third, how many cents worth of light was developed from the consumption of a dollar's worth of gas. All the burners were new and clean, and of the ordinary "E. H. Lava Tip" style.

No.	1	Tip, at	4.8	cu. ft.	per hour,	gave	62	cents worth of light per $1 of gas.	
"	1	"	2.9	"	"	"	51½	"	"
"	1	"	2.5	"	"	"	49	"	"
"	1	"	1.7	"	"	"	47	"	"
"	2	"	10.0	"	"	"	66	"	"
"	2	"	9.3	"	"	"	69	"	"
"	2	"	5.8	"	"	"	75	"	"
"	2	"	3.6	"	"	"	83	"	"
"	2	"	2.3	"	"	"	81	"	"
"	3	"	10.2	"	"	"	71	"	"
"	3	"	7.6	"	"	"	75	"	"
"	3	"	5.0	"	"	"	94	"	"
"	3	"	3.6	"	"	"	89	"	"
"	3	"	3.0	"	"	"	89	"	"
"	3	"	2.3	"	"	"	80	"	"
"	4	"	11.0	"	"	"	93	"	"
"	4	"	6.7	"	"	"	92½	"	"
"	4	"	5.0	"	"	"	94	"	"
"	4	"	3.+	"	"	"	91	"	"
"	4	"	2.2	"	"	"	87	"	"
"	5	"	13.2	"	"	"	86	"	"
"	5	"	7.4	"	"	"	96	"	"
"	5	"	5.1	"	"	"	99	"	"
"	5	"	3.3	"	"	"	90	"	"
"	6	"	14.2	"	"	"	94	"	"

No. 6 Tip, at 9.2 cu. ft. per hour, gave 102 cents worth of light per $1 of gas.										
" 6	" 5.8	"	"	"	100	"	"	"	"	
" 6	" 4.8	"	"	"	100	"	"	"	"	
" 6	" 2.8	"	"	"	84	"	"	"	"	
" 7	" 16.0	"	"	"	96	"	"	"	"	
" 7	" 10.0	"	"	"	101	"	"	"	"	
" 7	" 6.5	"	"	"	102	"	"	"	"	
" 7	" 7.0	"	"	"	103	"	"	"	"	
" 7	" 4.0	"	"	"	94	"	"	"	"	
" 8	" 16.6	"	"	"	98	"	"	"	"	
" 8	" 11.4	"	"	"	103½	"	"	"	"	
" 8	" 8.0	"	"	"	106	"	"	"	"	
" 8	" 4.8	"	"	"	100	"	"	"	"	
" 10	" 17.4	"	"	"	95	"	"	"	"	
" 10	" 12.8	"	"	"	104	"	"	"	"	
" 10	" 9.4	"	"	"	96	"	"	"	"	
" 10	" 6.2	"	"	"	100	"	"	"	"	
An Amer. Meter Co.'s Standard No. 40, at 18.2 cu. ft. per hour					gave 103	"	"	"	"	
do. " 30	18.2	"	"	"	103	"	"	"	"	
do. " 30	8.7	"	"	"	104½	"	"	"	"	
do. " 30	7.5	"	"	"	104	"	"	"	"	
do. " 30	13.0	"	"	"	108	"	"	"	"	

An American Meter Co.'s Old No. 6, at 8.4 cu. ft. per hour, gave 68½ cents worth of light per $1 of gas.

An American Meter Co.'s Old No. 5, at 8.2 cu. ft. per hour, gave 66 cents worth of light per $1 of gas.

An American Meter Co.'s Old No. 4, at 4.8 cu. ft. per hour, gave 53 cents worth of light per $1 of gas.

An American Meter Co.'s Old No. 4, at 4.8 cu. ft. per hour, gave 51 cents worth of light per $1 of gas.

An American Meter Company's "Old No. 5" (at 6 feet per hour), inside an opal globe, gave a return of 24—or 24 cents worth of light for a dollar's worth of gas. An American Meter Company's No. 40 (at 13 feet per hour), with a sheet of white paper behind it, gave an economy of $1.75, or nearly double the value obtained from the Sugg standard burner.

An inspection of the foregoing tests will show that the ordinary burner tips, even when quite new and clean, have a wide margin for variation of rate without material loss of economy. For instance, three feet per hour would give, practically, the maximum effect when consumed through a No. 3, 4, or 5 tip. Four feet per hour would do equally well with a No. 4, 5, or 6 tip. Five feet per hour would produce the same results with a No. 5, 6, or 7 tip. Still, actual economy of light is not all that is to be sought after, for a well-shaped, bright, and smooth flame is equally desirable. My own preference, in burners calculated to light business places, is for the No. 8 tip, at from seven to nine cubic feet per hour. These develop a high rate of economy, and give an exceedingly beautiful flame.

The idea of increasing the illuminating power of his gas to the extent of 25 per cent. without any corresponding increase in its cost is likely to stagger the average gas manager; but it is quite easy to practically effect the same result, almost without cost, and at comparatively little trouble. It is in out-of-the-way places, or where the gas is not used regularly, that best results can be achieved. In sleeping-rooms, parlors, hallways, kitchens, offices, churches, public halls, etc., etc., you will find burners in duty which have been in use for ten years or more. Some of them, perhaps, will develop only 20 or 30 cents of light per one dollar's worth of gas. Remove these and replace with tips properly adjusted to the desired rate of consumption—lest the electric light folks might find them out and endeavor to show others, to your disadvantage, that your gas has an illuminating value of only 8 candles.

Burner tips are cheap—a clean one costs less than a cent—and, if properly adjusted, will, in the matter of increased light, earn 10 per cent. annually on a good many dollars. A portion (a round one at that) of which earning, I may safely assert, will in due time accrue to your own benefit.

Discussion.

Mr. Jenkins—I would like to ask Mr. Chollar how he adjusts the tips to burn the required amounts.

Mr. Chollar—A company in New York city makes a tip adapted to that end.

Mr. Jenkins—If those tests were made, say, at some extreme point in the town, or, at any rate, outside of the works, you might not get the same results.

On motion of Mr. Howard, a vote of thanks was tendered to Mr. Chollar.

The concluding papers, owing to lack of time were not discussed. The first of these was read by Mr. Edward Lindsley, of Cleveland, Ohio, and, with its title, is as follows:

THE GAS BUSINESS: ITS OPPORTUNITIES AND REQUIREMENTS.

Mr. President and Gentlemen of the Association:—At the close of the festivities which followed the sessions of the American Gas Light Association at Cincinnati last fall, when many of the members were engaged in hand-shaking and leave-taking, preparatory to a return to their respective homes, among the last with whom I exchanged greetings was our worthy President. A portion of that ceremony was a request on his part, and a promise on my own, that I would prepare a paper to be read at this meeting. The cordial earnestness of Mr. Somerville, and my own warm appreciation of the value of the meetings of these Associations to the interests we represent, together with the feeling that each member should contribute, if but a mite, prompted a ready acquiescence on my part.

Through the American Gas Light Journal, of May 3, our Secretary has announced me in connection with "The Gas Business: Its Opportunities and Requirements"—which, it may be taken for granted, refers to gas distilled from coal. While I make no apology for presenting a topic that is possibly not as germane to the general line of subjects usually considered at these meetings, may I remark, as a sort of preface to what I shall say, that no attempt will be made to exhaust the subject, nor indeed to do more than advance a few thoughts suggested partly by experience, but more largely by the queries of others—and those thoughts will be directed more particularly with reference to the identification of individuals with the gas business, and the opportunities it will afford them to achieve such success as a reasonable, youthful ambition may desire, together with some reflections as to the qualifications (natural and cultivated) requisite to attainment to the desired success.

As I proceed, the thought may suggest itself that this paper might better have been designated "A Chat with the Younger Members." Be that as it may, they are largely in my thoughts; and I anticipate a large place for many of them in the future in connection with our business—the frequency with which I have heard its growth and future prosperity questioned, to the contrary notwithstanding.

Among the serious and important questions which men ask themselves, few are more so than that which presents itself to nearly every young man at an early period of life—viz., "What shall my vocation or life-long occupation be?" And it is of the gravest importance that it be answered correctly. Mistakes may be made in deciding many other and very important questions, and not necessarily entail disaster; but an error in this matter can hardly fail to be followed by undesirable, if not disastrous, consequences. Indeed, a young man can ill afford to make a mistake in this all-important matter.

This is so well understood, and seemingly almost by intuition, on the part of thinking young men, that I fancy very few decide the matter without saying to some near and older friend, "What occupation would you advise me to follow?" And it is only advice that a friend ought to give. The final decision must be made by the individual, after a careful consideration of all the factors in his own case. Among these personal taste, natural fitness, aptitude, and like considerations should not be lost sight of; as, generally speaking, other things being equal, one will be more likely to succeed in a calling toward which he has a strong inclination. Of course, no amount of natural fitness or inclination would insure a young man success in a line of business that, in the progress of events, had become nearly or quite obsolete. To illustrate, I have known bright examples of success in life who, at an early period, were associated on the ground floor with canal-boat and stage-coach enterprises; but we can hardly conceive of conditions to-day that would encourage hope of any large degree of success in connection with those old methods of transportation. Watch-making was at one time a prominent and, it would seem to me, a very attractive business in England. A quite recent newspaper article sets forth that it is now a waning industry, and that men who have followed it for years are being compelled to direct their energies to other pursuits. But instances in illustration need not be multiplied; we all know that a business to be attractive ought to present fairly well defined opportunities.

Does the gas business do so at present? And is it likely to do so in the future? Or has its day of usefulness nearly passed? This question, in some form, has been propounded to the writer times almost without number during the past sixteen years, and in many instances by young men about to choose an occupation. Indeed, since the inception of the present month a young man, with exceptionally fine advantages, so far as education and experience in the business go, asked, apparently in all seriousness, if I believed the day would come when the electric light would practically supersede gas as an illuminant. And so, what with the development of electric lights, arc and incandescent; storage batteries, so called; petroleum adaptations in one form or another; and finally the recent application of natural gas to useful purposes—is it much wonder that the faith of many intelligent people is shaken as to the opportunities in connection with the coal gas business?

Before committing ourselves to such fears let us glance briefly at its

history. Practically, it dates back about one hundred years, during which time its use has steadily and rapidly increased, but at no time more rapidly than in these later days of competition with improved methods of illumination. And how has this result been brought about? By adaptation of the product to new uses, and by improvements in the manufacturing and distributing plant. Improved furnaces, retorts, settings, condensers, purification—improvement, in short, in the entire range of processes, from handling the crude coal to the delivery of the finished product at the consumer's burner. Not great and startling improvements; but improvements, nevertheless. And the belief is indulged that the end of improvements and new adaptations is not yet, and that the gas man's opportunity lies in that direction.

The oldest of us were made acquainted with mathematical equivalents in our early school experiences; but notwithstanding the teaching of modern science, in the direction of chemical, mechanical, and other equivalents, the youngest man present, if he be a thoughtful student, and lives to be old, will still stand on the threshold of knowledge concerning equivalents, as we dimly perceive them to-day.

The scientific mechanic introduces coal to a carefully constructed furnace, designed to realize perfect combustion as nearly as possible; and at the other end of the line he withdraws a block of crystal ice. The relation between the heat units required to restore that block of ice to water again, and of the same temperature it had in the start, and those developed in the combustion of the coal consumed in the furnace determine how closely he has realized the law of equivalents in that case. Imperfect combustion, convection, radiation, and friction being answerable for the discrepancy—imperfect combustion being the chief sinner, and friction and the other evils only slightly less wicked.

For our present purpose, however, we need not take time to suggest remedies for the latter-named imperfections; but for imperfect combustion, what more has man to do than be taught by nature and intelligently avail himself of her bountiful promises? She has surrounded him and the earth on which he dwells with an aeriform or gaseous fluid, a large proportion of which is the great supporter of combustion, and that in the best possible condition for prompt and perfect combination with the combustible. Nature might have gone further, and given us the combustible in gaseous form as well. Indeed she has, to some extent; for which the Pittsburgher—at least some of him—is duly thankful.

And this suggests a slight digression, which pardon me if I indulge. I spent some days in Pittsburgh a short time since, and the manufacturers there assured me that it was not a matter of vital importance whether natural gas had come to stay or not. If it failed, solid fuel would never be used there again, so thoroughly has practical experience demonstrated, on a large scale, and on all sorts of scales, the superiority of gaseous fuel. And the prediction is ventured that, when the history of natural gas shall be written, it will appear, possibly as an indirect, but nevertheless as a potent factor in the development of the manufactured article.

But as this paper is already assuming proportions greater than those originally intended, probably suggestions sufficient and definite enough as to opportunities have already been made. That the development of them will depend largely upon the fulfilment of requirements most will admit. The consideration of them, of course, may be from different standpoints. The thought in my own mind, however, is with reference to the qualifications of men to whom may be intrusted the management of the practical details of manufacture and distribution, rather than to those of a purely financial character. And perhaps right here I ought to acknowledge that I approach this part of my subject with a considerable degree of diffidence; indeed, I would prefer to have it a chat with the youngest of the younger members. Consequently, if the veterans choose to consider themselves at church and indulge in a short nap, I certainly shall not object.

Therefore, my young brothers, in the light of more than fifty years of experience in life, sixteen of which have been in the business you have recently entered upon, I whisper to you confidentially my belief that the opportunities open before you are no whit less than those presented years ago to your predecessors. Fulfill the requirements, and success will follow commensurate with your most sanguine expectations. Just what the requirements are may not in each and every case be a fixed and definite quantity, easy to describe and easy to learn.

If asked to say in one word what a gas manager should be, that word would be *versatile;* but, more definitely, he should be a man of resources, both with reference to his own movements and the movements of others. Possessed of self-control in large measure, he may the better control and direct others—as thoroughly systematic in the conduct of his duties as their sometimes somewhat erratic nature will permit; inclined to be personally mindful even of small details; a student himself, an instructor of his subordinates—not unduly familiar with them, but always courteous. As an instructor, he should be the embodiment of thoroughness, that his methods may become second nature to the instructed—thus insuring the carrying out of the details of a class of work according to his own design and plan in each and every instance, as well when absent as though personally present.

Of requirements of a more special or definite nature, it may be said that not every gas undertaking is established on a scale of magnitude to admit of the employment of a first-class engineer, with a corps of skilled assistants and draughtsmen; an analytical chemist; superintendent; foremen of various departments; inspector of meters, and competent men to repair the same; mechanics of various sorts, such as machinists, blacksmiths, gas-fitters, pattern makers, carpenters, etc., etc., all of a high order of mechanical and intellectual attainment. Indeed the average gas works, as compared with a few of the large metropolitan concerns, is a small affair, and cannot afford the array of cultivated talent supported by its more aristocratic relative.

Nevertheless, such service as the above indicated talent may render is often desired and sometimes absolutely required in the conduct of every gas business; and if that talent can somehow be embraced in the person of a single individual, it is a point gained, of no mean importance, in favor of the average or small works. Of course it will not be pretended that he must be an expert in all of the above indicated accomplishments; but he may and ought to have a general executive idea, and some (and the more the better) mechanical ability in the directions indicated. If to the foregoing he add sober, steady habits, a fair measure of native intellect, and such acquisition of general knowledge as a studious and closely observant habit will give, and has a taste for the gas business, he will find no lack of opportunities to fill requirements.

In conclusion, gentlemen, I know the reflections presented are crude and incomplete. It has not been intended to do more than offer a few suggestive thoughts, from an individual standpoint, which possibly might provoke further thought in other and perhaps younger and fresher minds, and possibly, again, slightly encourage a younger brother and save to our fraternity a valuable element that might be inclined to diversion to other and less promising fields.

The Secretary now read the following paper, contributed by Mr. George Shepard Page, of New York city, on the subject of

THE PRESENT AND FUTURE CONDITION OF TWO IMPORTANT RESIDUALS OF GAS MANUFACTURE.

Mr. President and Gentlemen:—But for the earnest solicitation of your President and Secretary, I should not have occupied your time at this convention. It is possible, however, that a few expressions concerning the present and future condition of two important residuals of gas manufacture—tar and ammonia—may be of interest.

It is almost needless to refer to a fact so well known to everyone identified with the gas maker's profession, that the market value of the named products has, in most parts of the world, greatly diminished within two or three years. The main causes for the great falling off in the value of tar are about as follows: The three most valuable products of coal tar, in the order of the returns received per barrel, have been pitch, anthracene, and benzole. Much dissimilarity exists in the manner in which pitch is worked up or applied as between Europe and this country. In Europe it is used almost exclusively for the manufacture of artificial fuel. About 10 per cent. of the material is required for the consolidation into blocks of the otherwise waste bituminous coal dust of Belgium, France, and England. In this country the almost exclusive use of pitch is for roofing.

The great falling off in the value of pitch for fuel has been due to two causes: First, the cheapening of the coal in its larger form, through the lower cost of labor and the introduction of mechanical appliances in mining; second, the introduction of various mechanical devices for the burning of coal dust.

Four years ago coal tar pitch sold in London for 36 shillings ($9) per ton, in bulk, and coal tar was selling at 42 shillings ($10.50) per ton—the English mode of marketing this residual. The *Journal of Gas Lighting* of April 29, 1886, quotes tar at 7 shillings per ton and pitch at 15 shillings.

Anthracene, the base of alizarine (artificial madder), formerly sold at 2s. 6d. per unit per hundredweight. The present market price is 10d. per unit. Benzole was then selling at 10s. per gallon; but the present price is only 1s. 6d. per gallon.

It will be clearly evident, therefore, that good reasons must exist for this remarkable decline in coal tar prices. Gas companies having found difficulty in marketing their product at even this low figure, several have commenced to burn the tar under the retorts. The movement in this direction is so marked that within a short time doubtless the overproduction will be exhausted.

It will be of interest to you to know why there should be so remarkable a falling off in the values of anthracene and benzole. The initial high prices of these two products naturally led to their increased manufacture, not only in European countries, but also in the United States. The large profits obtained by the original manufacturers of aniline dyes inspired an increase in

the number of works employed in the manufacture of these chemicals. Soon the market was supplied. Competition for the trade could lead to but one result. A constantly increasing pressure was brought to bear upon the manufacturer of benzole and anthracene. Prices were borne steadily downward; indeed, so low a point has been reached that the majority of manfacturers here and abroad have ceased their production.

Recent numbers of the *Journal of Gas Lighting* contain correspondence and editorials indicating the very rapid increase in the consumption of tar as fuel in gas making. Mr. George Livesey, of the South Metropolitan Gas Company, of London, states that at the last meeting of the board of directors of that company a resolution was passed instructing the engineer to at once begin burning the tar at all their stations. He says, "Tar at 7s. per ton (4¼d. per cwt., or less than a penny per gallon) is the cheapest fuel gas makers can use." Several other of the important gas works in England have decided to use up the whole or the larger part of their product in their furnaces.

Another important movement in order to bring about the time when coal tar shall again become of greater value, is that of the introduction of liquid fuel under stationary and marine boilers. By the use of certain appliances steam is produced at very much less cost than from coal. A large screw steamer has been specially fitted up with capacious oil tanks, the oil from which is used instead of coal, and the plan is found to work satisfactorily. The stated consumption of oil amounts to a trifle over 8 gallons per hour; or say 200 gallons per day. This costs about £1, or $5. The cost of coal for the same period would be £7, or $35. Great saving is also effected in the item of labor. Where five men were required with coal, two only are needed with the oil—no shoveling of coal or removal of ashes is called for. The steadiness of the fires, and the ease with which they are regulated so as to give the required amount of steam, and the entire absence of smoke even when the fires are forced to their greatest extent, give this method great advantages.

The use of liquid fuel is being thoroughly tested on some of the ships of the English navy; and it is believed that within a short time this new outlet for the use of creosote oil will more than compensate for that formerly afforded in wood preservation. It should be stated, however, that the consumption of this oil for use on railroad sleepers, bridge and dock timbers, and other structures, still continues. To such an extent, however, has this work been done in Europe, and so thoroughly efficient is it, that the increased use there of creosote is only for the addition to and enlargement of existing structures.

You will probably be more interested, however, to be advised as to the outlook for tar and tar products in this country. As before stated, the chief use of pitch has been for roofing. In consequence of the depression in the building trade experienced in the past three years, the consumption of pitch has largely fallen off. The low price of fuel pitch has prevented the exportation of a large quantity, and the steady increase in the output of gas carbonization of coal has caused in the past five years a largely increased tar production. Hence, in some sections of the country—notably at New York and Philadelphia—an accumulation of tar has taken place far beyond the demand for tar products. Sharp competition ensued between these great sources of supply and other sections of the country, whereby the selling prices of pitch were reduced to lower figures than ever before known.

Petroleum naphtha was substituted in many places for creosote oil as fuel, notably in glass making. Only a few creosoting works have been established here. The outlet, therefore, for creosote oil diminishing, manufacturers competed keenly for what business offered. Few of the aniline dyes, and no alizarine, are manufactured in this country, in consequence of the low rate of duty, which permitted the English, German, French, and Belgian manufacturers to supply consumers here. Benzole must, therefore, be exported.

It is certainly gratifying to know that coal tar is now worth more in this country than in Europe. New uses for the products have been created. The falling off in the demand for pitch for roofing is being more than met by the use of it in new street pavements. Stone blocks, very much the same size and shape of the Nicholson wood pavement, are now being laid in many of our cities, three gallons of pitch to a square yard of pavement being used for filling in the interstices between the blocks. This makes the pavement practically proof against the admission of water.

Large quantities of pitch are also being used in the manufacture of the most valuable roofing, known to the trade as 2-ply and 3-ply. Two layers of felt are cemented together by the use of pitch. The 3-ply is united closely together by two layers of pitch. Liquid pitch is used for the final coating, which is finished by an application of fine sand or gravel. This forms the only thoroughly water-proof, and, when coated, fire-proof material which a farmer, or resident away from a city or town can effectively apply without the aid of skilled men. Enormous quantities of this portable roofing are being sold in the United States, and already an export demand has been created.

Wood preservation is slowly but steadily gaining ground. Each year sees a larger consumption of the heavy or dead oil of tar. It is also being used to some extent as liquid fuel. Without doubt the successful work in Europe will be continued and perfected here.

Advances are being made, by some of the larger coal tar distillers, in the production of fine products—carbolic acid, naphtha, naphthaline, and various manufactured articles in which these products are used. The demand for naphthaline for various purposes, including that of the Albo-Carbon Lamp, is growing rapidly.

A manufacturer in New York city produces probably the finest naphthaline now made in the world. Extensive machinery and various chemical appliances enable him to produce it by the ton. You will be interested to examine some samples which I have placed on the Secretary's desk.

Sharp competition between the coal tar distillers has been brought to an end and a combination formed. The country has been divided into districts, and the trade have respective districts supplied by a manufacturer located therein. Prices have been fixed, rules adopted, and a strong organization effected. It will without doubt be maintained for a term of years. This organization should not only be productive of profit to its individual members, but if it be wise it will see to it that the gas companies receive a fair return for the coal tar.

With the revival of the building interests, extended street improvements, and the carrying out of great public and governmental, marine, railroad, and other works, and the gradual introduction of the color industry, there should be a steady increase in the receipts of the gas companies for this residual.

The utilization of ammoniacal liquor has been more recent. It has been largely consequent on the introduction of improved washing and scrubbing apparatus, by which it was possible for a gas company to secure all the ammonia to be eliminated in the hydraulic main, condenser, and washer.

The principal product yet manufactured from ammoniacal liquor in this country is sulphate of ammonia. This is used most largely in fertilizers, and the reason for its low figure at present is due to the enormous importation of nitrate of soda. This is being mined to so great an extent in South America that the markets of the world have been overloaded. It is stated that the present selling prices pay profit neither to the miner nor the importer. A temporary advance has recently taken place in the price of nitrate of soda, which was immediately followed by an advance in sulphate of ammonia. For some unexplained reason, in the last three weeks, the latter has again fallen off in value. This is more surprising because of the fact that there is now the smallest stock on hand, both here and in Europe, that the trade has ever known. Doubtless these fluctuations in value are mainly due to excessive speculation.

A producers' organization has been effected in England, which is intended to maintain steadiness of values in the future.

A large consumption of ammonia prevails, both in the United States and England, for artificial refrigeration. Indeed, probably 20 per cent. of the ammonia now made in the United States is used in the form of aqua or anhydrous liquid ammonia, for ice making or cooling. The cities, towns, and even villages of the South are rapidly embarking in this new industry. The brewers, butchers, hotels, oil refiners, and many other industries in the North are finding artificial refrigeration cheaper and better than the use of ice. To such an extent has this industry affected the value of this residual that contracts for ammoniacal liquor in the United States have been made at higher rates than those now prevailing in England. There are many other new uses for ammonia. Some of them are yet in the sphere of experiment, but promising such good results that an increase in value in ammoniacal liquor is assured.

This much can be said, that at the present time no gas company can afford to allow its ammoniacal liquor to run to waste. There are mechanical appliances for saving and concentrating it, so that even if the quantity is not great enough to guarantee the erection of a plant for working it on the premises, yet, because of the concentration, it can be transported in tank cars to long distances. It is needless for me, however, to urge every gas manager to take steps to secure an income from the ammonia as well as from the tar.

[To be continued.]

The Economic Production of Coal Gas.

By R. P. Spice, C.E.

[We are indebted to the author for proof sheets of the following paper, which was read at a General Meeting of the Association of Municipal and Sanitary Engineers, held at Hawley, Staffordshire, on date of July 9th.]

Among the various classes of professional economists of the present day, the coal gas manufacturer deserves a niche in the muster roll of fame.

It has been truly said that the man who succeeds in making three blades of grass grow where only two had grown before is a benefactor to his country; and in measuring the importance of coal gas manufacture as a national

industry by the enormous supply which is constantly required to meet the demand for gas, by the many millions of people who depend very greatly upon that supply for satisfying their daily wants, in regard to light and heat, for manufacturing, commercial and domestic purposes, I have been led to the conclusion that, as an art and industry, it is fully entitled to occupy a high place in the scale of those economical agencies by means of which the solid financial prosperity of the United Kingdom is materially augmented.

In its early stage of existence the art of producing carburetted hydrogen gas, on a commercial scale, had to encounter and struggle with difficulties to obtain a footing, and to secure the favorable regard of those who wanted a better means of obtaining artificial light than was afforded by the "tallow dips," or the train-oil lamps of their forefathers. Great indeed were the opposing forces of the many unbelieving and self-interested objectors to the adoption of the new light of King Coal, introduced by the ingenious Cornish miner, William Murdoch.

These adverse influences were, however, in the course of two generations of the human family, all overcome; and in the succeeding generation, which is now passing away, the progress of gas lighting has been marked by uninterrupted growth, increasing prosperity, and rapid expansion. Stimulated, as this progress has been, by the healthy rivalry of our electrical brethren, by whose skill and devotion the science of electric lighting has been raised to its present highly advanced state of perfection; aided also by the ingenious devices of thoughtful men in our own ranks, so applied in practical working as to result in improving quality, increasing purity and efficiency, and decreasing the cost of production.

I do not propose on this occasion to go into the history of the host of economical methods employed at the present time for producing crude coal gas in the state in which it leaves the retort; but in complying with your request for a paper on "Modern Gas Manufacture," I purpose to treat the subject in a popular rather than in a technical way; and I therefore purpose to commence the review at a recent period, with the consideration of the preparation of the coal for carbonization.

In the ordinary way, for half a century at least, it had not been part of the routine of the business to prepare the raw material in any way; just as it came from the ship or the railway, so it went into the coal store, and from thence it was conveyed into the retorts. But, within a recent period, it has been found profitable to prepare the coal by passing it through a coal-breaking machine, by which the large lumps are broken into small pieces, so as to admit of the whole being raised by an elevator composed of buckets made of sheet steel, carried on an endless chain, and delivering into a fixed overhead hopper, from which it is allowed to fall, when required, into a lower hopper or receiver; this receptacle forms the upper part of a retort-charging apparatus, the whole of it, with its supply of coal, is carried on wheels, and propelled on rails laid in front of the retort benches. The charge for each retort is dropped from the hopper into a little wagon, which, running on suitable wheels, is pushed forward into the retort, and by a simple mechanical arrangement the coal is suddenly deposited in a uniformly thin layer on the bottom of the retort; the wagon in an instant is withdrawn, the charging machine pushed forward to the next retort on the same level, and the lid of the charged retort closed; the whole process of drawing and charging being completed in one minute.

The advantages thus secured are considerable.

Firstly, there is a saving of time in performing the operation of charging and drawing, thus permitting of a greater number of retorts being worked by the same number of hands.

Secondly, there is less gas lost in proportion to the shorter time during which the retort is open while the charge is being deposited.

Thirdly, the charge being laid in a uniformly thin layer, the heat of the retort acts more rapidly and effectively upon the coal than is possible when it is laid in a thick and unequal mass, composed of lumps of various sizes and small particles; and as this saving of time amounts to one-third of that required on the old plan, it follows that only two-thirds of the number of retorts need be employed to do the same amount of work as formerly, and the saving in capital is in the same ratio.

Fourthly, there is the advantage of being able to effect the extraction of the gas from every part of the charge of coal at the same instant of time, without having to wait for the heat to penetrate to the interior of the mass till the outside of it is over-done, and poor gas thereby be evolved before the center of the charge is carbonized.

And, fifthly, by these mechanical aids, the character of the labor employed in the retort house is rendered far less trying to flesh and blood than it can possibly be without them.

The apparatus thus briefly described is known as "West's Patent Charging and Drawing Apparatus;" and after having seen and considered the merits and demerits of all other contrivances, designed with the same object in view, I have arrived at the conclusion that for simplicity, economy, and general efficiency it is entitled to rank first in the list.

So much, then, for the groundwork or first stage of the manufacture. We now come to the consideration of the means employed for removing the impurities contained in the crude gas as it commonly leaves the retort. Formerly all these impurities went forward, and purification was effected for many years by the use of wet lime—that is to say, lime and water, in iron boxes; the mixture being mechanically agitated while the gas was passing through it, and when the lime had become saturated and spent, it was run off into pits or chambers to dry; the residuum was called "blue billy," and, on exposure to the atmosphere, this became a choice nuisance as a specimen of very pungent perfumery.

This system was superseded by the adoption of the dry lime method, which was a nuisance of less degree, and long held in favor because of its effectiveness for the purpose of purification; so effective is it that antiquarian gas men of the fossilized type still employ it, notwithstanding its being a nuisance to all who are obliged to live within a mile of a gas works, where fresh and balmy breezes, which would, in their purity, be healthful, convey their noxious stench into the atmosphere surrounding inhabited districts.

Some years since oxide of iron became used as a purifying agent, and was generally adopted in place of lime. This, however, did not satisfy the requirements of modern scientists, who soon proved that, although it would remove all the sulphuretted hydrogen, the removal of which had formerly been considered as the acme of the gas maker's art, it did not remove sulphur in certain other forms, denominated "sulphur compounds."

And this objection was so warmly taken up by the sanitarians and analytical chemists of the period, that something like the "Wars of the Roses" resulted; battle after battle being fought with pen and tongue, till means were devised for effecting the extraction of a portion at least of these newly-discovered impurities.

This object was ultimately accomplished by combining the use of lime with oxide of iron; the gas being made to pass through lime purifiers first, and next through purifiers containing oxide of iron. This method is still adhered to in London and in some other large cities, notwithstanding that a far better and more reliable method has been firmly established.

The objection to the lime and oxide process is twofold; inasmuch as it is unreliable, and involves the creation of a nuisance in the vicinity of the works, and often for a considerable distance therefrom, by the stench occasioned when the lime purifiers are opened and their noxious contents discharged into barges or other vehicles for the purpose of being conveyed away to parts unknown; as in the case of the British Gas Company at Norwich, where legal proceedings were recently taken to suppress the nuisance. Why gas companies should be so ill-advised as to continue to court such unenviable notoriety is entirely beyond my comprehension.

The lime, when used, is first slaked, and in its primary condition, when placed in the purifiers, does very little work in the way of taking up the sulphur compounds, only attaining efficiency after sulphuret of calcium has been formed by passing sulphuretted hydrogen and carbonic acid through it; and as the chemical changes, resulting from the varying proportions of sulphuretted hydrogen and carbonic acid, are constantly occurring as the gas is passing through the system of purifiers, the manager does not at all times know where he is, or what he has got; hence it happens that, with his utmost care, he cannot at all times keep these troublesome compounds within the limits now commonly defined by modern legislation. Consequently we hear occasionally of pains and penalties being inflicted on gas companies; the Newcastle-on-Tyne, and the Crystal Palace District Companies having recently both been fined for such infractions of the law.

And so recently as in the week ending on the 22nd of last month the Commercial Gas Company, of London, failed to keep within the limits allowed in the metropolis; their gas being then reported by the official examiner as containing 17.7 grains of sulphur in 100 feet, the limit allowed being 17 grains.

There is, however, no longer any excuse for such shortcomings, for it has been established beyond controversy that nothing is easier, or more certain of accomplishment, than to keep these sulphur compounds down within the limits defined by the London Gas Referees; leaving a safe margin for any occasional causes of interruption or inattention.

The method to which I refer is the now thoroughly established coal liming process, patented by Cooper.

It is sometimes a trial of patience to have to listen to an oft-told tale; but at the risk of being considered tedious, I must bring before you the fact that this method of dealing with the impurities contained in crude coal gas has been in uninterrupted use at the Tunbridge Wells Gas Works for two years and eight months; and whether in winter or in summer, with good coal or with bad coal, it has never once failed to yield to the prescribed treatment, when that treatment had to be slightly modified to suit the several qualities of sea-borne coal operated upon; and so entirely are the conditions understood that the character of the coal being ascertained, the results as to the reduction of the sulphur compounds can be accurately foretold.

Constant practice and repeated experiments made for me by Mr. Dougall,

at those works, have established the rule, and placed beyond doubt the fact that by increasing the prescribed quantity of 2½ per cent. of lime slaked by its own weight of water, to 3 per cent. slaked with the same proportion of water, the sulphur compounds will be less by 2 grains in 100 feet, and every additional half per cent. will reduce the quantity of sulphur 2 grains; so that if it be assumed, by way of example, that 2½ per cent. of lime will reduce the quantity commonly contained in crude gas, from, say, 30 grains to 14 grains, 3 per cent. would bring it down to 12, 3½ per cent. to 10, 4 per cent. to 8, and 4½ per cent. to 6 grains; there is nothing uncertain, but there is entire independence of the capricious formation of sulphuret of calcium, and of the casually altered conditions; nor are any chemical experts required to be in close attendance upon the working, day and night.

The impurities which, previous to this process becoming known, were a serious cause of anxiety in the purifying house, are no longer a trouble; they are dealt with in the retort house, and about four-fifths of them are arrested in the retort, transformed by lime and heat, and rendered innocuous in the coke, which burns more freely because of the presence of the supplemental small percentage of lime, and experience has established the fact that, owing to its improved character, the demand for this coke has so sensibly increased that there is never any in stock at Tunbridge Wells, whereas, previously to the adoption of the coal liming process, it was commonly the case that there were from 500 to 700 tons of coke in the yard; and although 12,000 tons of coal are carbonized at these works yearly, the coke produced is sold so readily that an order for two railway truck loads has had to wait two months for execution.

One great merit of this "Patent Coal Liming Process" is the sanitary advantage afforded by the entire abolition of purification by lime, and the concomitant evil of mephitic odors being disseminated in the vicinity of the works, and for some distance beyond, sometimes daily, and in most cases every few days, when a foul purifier has to be opened and cleansed. The nuisance thus caused is no longer excusable, because the offence is avoidable; and to continue it is absolutely wasteful to the extent of not less then a penny per thousand feet of gas sold, even at the present low values of residual products, and after the payment of royalty for the use of the patent process.

Now, if this penny, which may be saved, is not wanted to make up the required dividend in any given case, it ought, in common honesty, to be saved nevertheless, by being left in the pockets of the consumers, instead of being needlessly taken therefrom.

It cannot, however, be pleaded by either gas companies or corporate bodies who carry on the manufacture of gas for the benefit of rate-payers, that cheapening the process of gas making to the extent of a penny per 1,000 feet is not an economy worth thinking about, when from all parts of the country the universal complaint is, that, owing to the reduced value of ammonia and tar, the profits of many gas undertakings are seriously reduced or have vanished entirely, and left, in some instances, not merely an "aching void," but a serious balance to the debit account.

Under these circumstances, which have been proclaimed apologetically from "Dan to Beresheba," one would think that as every 120 million feet of gas manufactured on the old lines cost just £500 more than it could be made for on the coal liming process, men would polish their spectacles and look the facts in the face; and if they did they would find the question proved up to the hilt in favor of the process, by actual and uninterrupted experience, extending now to close upon three years. The first of a series of five purifiers into which gas from limed coal was first turned, two years and eight months since, is still at work as No. 1. It has been opened and emptied only twice in that time, and on each occasion only one-half its contents returned to it.

The last two of the series were soon shut off because it was found that the gas was always pure before it reached them, and because, also, of its being found that on shutting off the fifth box the illuminating power of the gas rose half a candle, and by shutting off box No. 4 another half candle was gained; the consequential effect being the saving of 1½ per cent. of cannel.

This fact should teach a lesson to those men who have been boasting of their ability to make oxide purifiers last for so long a time without a change as to distance all other competitors for fame; their great achievments being accomplished by employing inordinately large quantities of oxide, and leaving the sulphur compounds in the gas. They are simple and liberal men who sell the gas they make, and give those compounds in! The ability really belongs to the oxide, and not to the men.

At the time when limed coal gas was turned into these five boxes they contained 150 tons of oxide, 30 tons being then the usual charge for each box; but with coal limed gas one-fourth that quantity, or 7½ tons, is ample for a box 20 feet square, for a make of 120 million feet of gas per annum from Newcastle coal, and three boxes that size would suffice for any work of that capacity.

As to the quantity of oxide employed, experience of both systems at the same works has established the fact that on the old lines it would have cost £60 per annum to keep up the stock of effective material, to say nothing of the cost of emptying, revivifying, and recharging the boxes; but with the coal liming process it has cost nothing for material, and of the original 150 tons at first used, not more than 30 tons are now actually in use, 120 tons not being required; besides which, of the stock of new oxide in store ready for use in 1882, 53 tons have this year been sold to neighboring gas companies as surplus stock, at cost price, for the use of which, within any reasonable period, a probability could not be anticipated by the resident engineer.

But beyond the oxide costing nothing, it may fairly be reckoned that a profit will result from its use, for of the 7½ tons now in the box No. 1, 90 per cent. is sulphur; and the extent to which this accretion of sulphur may be carried has not yet been ascertained; at present I can only form a rough estimate of it by taking into account the percentage of sulphuretted hydrogen arrested as the crude gas passes through No. 1 box.

The crude gas entering this box contains 300 grains of sulphuretted hydrogen, and only 90 grains are now being arrested; this shows a falling off of 208 grains in two years and eight months, for at the commencement 298 grains were arrested out of the 300, but to continue using No. 1 box only leaves the others more to do; therefore I am continuing it merely for the sake of obtaining data for use in connection with the future development of the system.

This economy in regard to cost, or no cost, of oxide, is by no means the most important advantage which has been proved to accrue from carbonizing coal in the presence of lime, under proper regulations and conditions, for a great gain is realized by the resulting increase of ammonia, which amounts to 30 per cent. beyond the normal quantity. And it will hardly be denied by any man capable of managing his own affairs, that if, owing to the reduced market value of any article of commerce, say, sulphate of ammonia, for instance, he can only realize half the profit he formerly made, the cost of production remaining the same in both cases, he will improve his balance sheet by increasing his production, provided he can accomplish the increase without employing any more capital, or adding sixpence to his expenses.

By way of illustration, take the case of a yearly sale of 1,000 tons of sulphate of ammonia, and put the present profit as low as £5 per ton, the net profit would be £5,000; the 30 per cent. increase would give an additional £1,500; bringing the net profit up to £6,500.

The next step in advance to which I would refer, as affecting the economical production of coal gas, is the application of the principle of gaseous firing to the carbonization of coal. This, however, although it has only recently come to the front, was initiated many years ago, and was the product of the fertile brain of the late Sir William Siemens, whose name to us will always be "familiar as a household word."

Others have followed up his ideas, and various have been the results achieved. I need not detain you by referring to the various systems or designs for generative or regenerative furnaces. Some are costly contrivances, and objectionable on that account, and also on account of their being complicated, neither of which objections will apply to the last which has come under my notice; and that is the one designed by Mr. Wm. A. Valon, of Ramsgate, which, for the economical heating of retorts, I regard as being the essence of simplicity; and as one-half the coke formerly used for heating ovens, containing seven retorts, does the same work effectively, with less cost for wear and tear, and the abolition of the most trying part of a stoker's duty—namely, the furnace work, I am satisfied with it and have adopted it. But it does not please everybody; it would be a miraculous furnace if it did; I am, however, not at all sure that trying to please everybody is a "game worth the candle," Æsop's familiar fable of the old man and his donkey is a case in point.

However, let that be as it may; let the grumblers grumble, and the contentious contend for their various fads and fancies, it is something to be thankful for that one-half the coke hitherto used as fuel may in future be saved; and of the other half, two-thirds may be saved by tar being used in its stead; for, with the generative furnace, nothing can be better than tar as fuel, for maintaining uniform heat in retort ovens, which is a fundamental consideration, always assuming that proper means of delivering the supply in a regulated stream be employed; and here again I may mention, that of the contrivances I have seen for using tar as fuel in the gas works of the United Kingdom, I regard the Ramsgate tar-tap, perfected by Mr. Bennett, to be the best. Concerning its practical working, I have found that in Valon's furnace one pound of tar will do the same amount of effective work as between four and five pounds of coke; but, taking it at only four pounds of coke replaced by one pound of tar, the following will be the result of a year's working at one works with which I am intimately acquainted.

As one pound of tar will do the work of four pounds of coke, and the value of tar at these works is one penny per gallon, coke being worth 15s. per ton, I take one gallon of tar as equivalent to 12 pounds, which represent the penny, the four pounds of coke multiplied by 12 gives the quantity of coke saved by the 12 pounds of tar, namely, 48 pounds.

The value of 48 lbs. of coke, at 15s. per ton.....	0s. 4d.
The value of the tar used in lieu of coke.....	0s. 1d.
The result is a gain of.....	0s. 3d.

Now, if no more than 100,000 gallons of tar be used as fuel at these works yearly—and much more may be used—the saving effected per annum by the substitution of tar for fuel in lieu of coke will be 100,000 times threepence, or £416.

In concluding this paper I desire to place on record a fact, obtained from a new source, concerning the effective action, so constantly and uniformly experienced in using the Coal liming process.

The new source which I refer to is an important and high-class seaside health resort, where the gas supplied has hitherto been purified by lime only, and at these works nothing has been spared to minimize the nuisance occasioned by the exposure and removal of the foul lime which has long been a trouble.

Within the last month or so the process has been introduced there, and is working with the same degree of satisfaction as at Tunbridge Wells, the latter being the smaller work of the two.

The sulphuretted hydrogen contained in the crude gas at the inlet of the purifier, at this latest scene of its triumph, was reported to me under the date of 18th June, as being 260 grains in 100 feet, and of this 255 grains were arrested in the first purifier, leaving only 5 grains to be taken up by the second box. Prior to the change from the old system to the new at these works the crude gas, made from the same stock of coal, contained 900 grains of sulphuretted hydrogen. Thus it is clearly shown that before reaching the purifiers the crude gas in this case had its impurities reduced from 900 grains to 260 in 100 feet, and of the 260 grains, only 5 grains were found at the outlet of the first purifier.

And here I leave the narration of the facts, which, at your request, I have compiled; but, if it be thought that no more can be said in favor of the modern improvements to which I have approvingly referred in this paper, it would be a delusion, which the Association of Municipal and Sanitary Engineers and Surveyors would never be considered capable of entertaining. In this direction much more may be said, and very much more will be done; let who will preach the doctrine of finality.

Service Leakage.

The *Gas Engineer*, in discussing this subject, says that the services are generally, and no doubt rightly, credited with the major part of the leakage, and that being admitted, it becomes a matter of importance to consider whether the best means have been and are adopted for preventing any unnecessary leakage in the necessary connections between the company's main and the consumer's burner. The ground to be covered is, of course, small, but it is important for several reasons. Time was when the only question for the gas manager was whether the dividend should be 10 per cent. or 12 per cent., and it required some anxious thought as to how the profits from manufacture could be used up. Corporations found a ready way of getting out of the difficulty by the handing of £10,000 or £20,000 to the Improvement Committee, who soon spent it in parks, hotels, royal receptions, or even, at a pinch, mutual admiration dinners. These worthies feel the loss of this "unearned increment," and, after parading before their constituents as to the economical way in which they could carry out improvements, feel somewhat at a loss how to keep up their prestige now that the much despised gas profits are likely to be diminished,

To-day, however, all this is changed, and with lessened revenue from tar, liquor, or sulphate, with gas at the lowest possible selling price, and the rate of increase seriously checked, if not reversed altogether, it becomes necessary for all gas administrators putting aside, or at any rate, accepting only as a *dernier resort* the possibility of raising the price of gas to do what is certainly the approved method of meeting a crisis such as this, viz., lessen the cost of production. Unfortunately, most of us have done much in this line before now, and our field of operations is at best limited; still, when we consider our leakage account, or, to be correct, when we consider the large amount of gas which is not accounted for, we must be led to think that here is a mine of wealth which, if only diverted to its legitimate channel, would fully recoup us for any loss we may at present be subject to, and have the effect of restoring fully our former position of prosperity. The money value of the gas made and not paid for is not always realized; and it is well for some managers that their committees do not go into the figures, or their lives would be made miserable thereby.

Under the most favorable circumstances it may be possible to get the leakage down to 5 per cent. on the total make. Supposing, then, the make was 20 millions, 5 per cent. would mean £165.

Make	20 millions,	5 per cent.	= £165	0.
"	30 "	"	= £247	10.
"	40 "	"	= £330	0.
Make	50 millions,	5 per cent.	= £412	10.
"	60 "	"	= £495	0.
"	100 "	"	= £825	0.

This is taking the gas at 3s. 6d. per thousand cubic feet. But then we generally find 10 per cent.—twice this loss—to be accepted as a good result, and in mining districts the utmost care and supervision will not bring the loss down below 15 per cent., and still more in some districts, 20, 25, or even 30 per cent. may be found. It may, in some cases, be found in works which are often lauded up to the sky as making 12,000 a ton and 8,000 a mouthpiece, that the leakage account is rather disorganized. For this matter each works must be a law to itself, and be guided by its own local circumstances, and having ascertained, by multiplying 1, 2, 3, 4, or 5, the figures opposite its own particular make, it will show how much in money loss its percentage of loss may be.

Then comes the remedy. The question of loss on mains, bad main laying, etc., we pass over now, and commence our investigation at the point where we tap the main to make our service connection. The quickest, neatest, and most workmanlike job in this department we ever remember seeing was done by a fitter from a large railway company, who, in a town through which we happened to be passing, appeared to have been sent down from headquarters to find out where a stoppage had occurred in their 3-inch main. His only tools were his chisel, rymer and tap, and while we looked on he marked out his hole, chipped it round, and had it out, examined his main, tapped his hole, and put in his plug. We do not recommend this course of procedure, for although it was satisfactory in this case, it is not one fitter in a good many who could have done it so neatly; and with a substance so far from homogeneous as ordinary pipe metal it is very risky and dangerous.

Undoubtedly the best plan is to provide the fitters with a drilling machine, but at present these articles are prohibited, by their extreme cost, from being used by any but very large works, and, on the other, the question of the leakage saved, while, of course, important to the large company who are connecting up every day, is much less so to the smaller undertaking. While judged by its aggregate amount, it is not, we think, calculated to very much affect the total of the leakage account.

The comfort of the fitters is, of course, a matter present in the mind of every well-disposed manager, and the same applies equally in this case. Mains are not tapped usually in confined places—there is generally plenty of room, and any escaping gas gets readily away from the main before it has time to injure him. It might, too, be added, in many districts, that while there is a constant leakage from the main itself, and while this leakage is generally to be found in the litter trench, which is invariably underneath the main, and is sensibly present whenever the main is disturbed; it is somewhat strange to guard the man against the litter which might come from the main he is tapping, and to disregard the whole atmosphere by which he is surrounded. Taken altogether, for a medium works, the best tools are a good ratchet brace, and hard steel drills, followed by the necessary chisels and taps.

Then comes the momentous question, "Shall our services be lead or iron?" In the wholesale condemnation of the latter we do not join. Iron services have their faults, but so have lead, and we contend that the one can be guarded against as well or better than the other; but at the same time we are quite open to admit there is a distinct field for lead services into which the iron cannot enter, and we claim the same for iron. The great advantage iron can claim over lead is that its defects are not like those of lead, inherent, but they are imported; an iron pipe laid in one soil will last for years, whilst in another it would be oxidized in a few months; hence it is not the iron but the soil which is the variable quantity, and which needs guarding against. And it can be guarded against with great success.

Let us now trace each kind of service, noticing its peculiarities in passing. The question of drilling on the top or side of the main has to be decided by circumstances. Each has its advantage, and here comes in the first difficulty with lead pipes—you cannot directly connect the lead to the iron; you have to call in a third metal, which is usually a brass ferrule. A very simple and useful steam fitting is founded on the law that metals differing in composition expand and contract at varying rates; and here we have a suspicion that a cause of leakage may be found at the very commencement of our service. The jointing of lead pipe, too, is a very difficult operation, and needs the employment of a good fitter. As the service proceeds, and supposing our pipe to be just the right length and to need no jointing, we have to pass to a very awkward part of the service, and to notice the chief fault of the bad service. Supposing the pathway to be flagged, asphalted, or made in some way, there is between it and the roadway the channel for carrying the storm water away. This is usually made of stone quarries, and from frequently getting saturated during storms and at other times, the ground underneath gets soft and unstable; the result is that the stones often rest on the services themselves; and after frequent complaints from a consumer that his light is little better than a candle, and frequent examinations of meters and burners, without success, it is always wise to commence an examination

of the service underneath the gutter, where it will often be found to be crushed as "flat as a sixpence." This evil is very much aggravated at times when a street is ordered by the Town Council to be forthwith made, paved, sewered, and channelled to the satisfaction of the borough surveyor. You then get the burly contractor, his navvy satellites laying bare your services, undermining your mains, and it is a wonder if you do not find an oft-repeated line from that street in your complaint-book, "water in service."

The poor lead pipe forms, too, a poor resistance to the pick of the honest British laborer, although, to do him credit, if he should make a hole at any time, he does not waste his master's time by running about to find the gas man. Oh, no; with a laudable desire to make up for the mischief he has wrought, he stops up the hole with a bit of nice, soft clay, and perhaps a piece of rag as well, and covers up the whole with loose earth.

The advantage of being able to bend lead pipe has been actually placed to its credit by some people; but this is a very questionable virtue. We far prefer a good iron bend, with its full gas way, than a strained, twisted, and perhaps broken lead pipe, in which the gas way is perhaps reduced to its lowest minimum.

One very great reform presents itself on this behalf in the relief of a crying evil, and that is the jointing of lead pipes either to other lead pipes or to iron or brass pipes; this cannot now be done without the intervention of the blow-pipe or the soldering iron each of which means special skilled labor, and also presents peculiar disadvantages. If the copper bit is used a fire is necessary to heat the irons, and in either case it is a matter of some difficulty to make a joint against the pressure of the gas. This has to be done in all cases in the fixing of the main tap, and in any alterations which may necessitate any breaking of the pipe before the main tap is reached, and itself constitutes a great drawback to the use of lead pipes.

The remedy would be found in a good union, making itself gas-tight without the use of heat and solder. Messrs. G. Orme & Co., of Oldham, are in the field with something of the kind, but it is not sufficiently forward, they tell us, to allow of its full description just now. However, in the sample we saw there appeared to be every element of success, and we can assure them that if it does succeed it will command a ready sale, and many imitators. It has often appeared to us strange that lead is used for all sorts of joints, and is never used to make its own.

Speaking just here of improvements, and before going more fully into iron services, a fruitful source of leakage would be done away with if the iron service was continued and connected on to the meter. Why not screw an iron connector on to the meter, put a tap and bend on that, and connect on to your service in the usual way, and the outlet the same? It would be just as easily disconnected, especially if the connector were made specially hexagon shaped, and would avoid all joining of different metals and consequent leakage.

That iron service pipes do away with all these evils, and themselves do not create others we do not claim, but we can safely challenge the lead pipe advocates to produce proof of any actual faults of as great magnitude existing in the use of iron pipes, as we have shown to exist in the use of lead ones. An iron bend or longscrew is easily and firmly fixed to the main pipe, and the joint is simply gas-tight. It is always an advantage to commence the service with a longscrew, as in case of a main being relaid, or the service in any way needing repair, a ready means is thereby afforded for getting at it; this is followed by long lengths, and brought into the house by means of the usual bends or elbows. The cutting and tapping of iron pipes used at one time to be much against their general use, but this is all obviated by the use of solid die stock, or a small screwing machine. The pipe is cut to size by means of a cutter, and threaded by once going on the machine. To prevent oxidation of the pipes by the soil, all ashes, etc., should be removed from the neighborhood of the pipe, and the pipe after being coated or laid in an asphalt or pitch trough be covered with clay and soil, and the road metal to finish up.

The chief object on which we would insist is not the advantage of any particular metal, but rather a question of workmanship. In these hard times make sure the leakage and waste are not aggravated by any wilful neglect, and endeavor, as far as possible, to remedy anything of the sort which has taken place in the past.

The Scottish Firebrick Industry.

Engineering, in mentioning some of the exhibits at the Edinburgh International Exhibition, notes the following in connection with the Scottish firebrick industry:

The firebrick industry is now pursued on a very extensive scale throughout several of the Scottish coal fields, and has developed steadily during the period that has elapsed since the Siemens regenerative furnace became a practical success. Such bricks as are specially fitted for resisting intense heats are produced chiefly from fireclays, gannisters, and siliceous rocks, which occur within comparatively limited areas in Lanarkshire and in the adjoining county of Stirling; and in some respects they are not excelled in quality by firebricks made in any other part of the world. The goods manufactured in the Glenboig district, near Coatbridge, have become well known in every iron and steel district in the kingdom, on the Continent, and in many of our colonies.

Several of the leading firebrick firms of Scotland have most interesting collections of their goods in the Edinburgh Exhibition, chiefly in Court II. As might be expected, a very prominent position is taken by the exhibits of the Glenboig Union Fireclay Company (Limited), whose works are the largest of the kind in this country; and the clay of which the most important exhibits are made has been most favorably reported upon by the leading metallurgical chemists. It contains a very small proportion of peroxide of iron, a substance which is specially concerned in the softening of firebricks, which are exposed to very intense heats in furnaces, etc. The percentage was as low as 1.70 in a sample of the calcined clay analyzed by Mr. Riley; and Sir F. A. Abel, in another sample, found it not to exceed 2.70 per cent.; whereas, in other first-class fireclays, the same substance is present in very much larger quantities—up to 6.33 per cent. in Stourbridge clay, and up to 6.90 per cent. in Newcastle clay. The Glenboig clay is very free from the alkaline bases—potash, for example, being present, according to Mr. Riley, in much lower quantity than he usually finds in the best fireclays. Not only are the Glenboig firebricks highly refractory in the strictest sense of the term, but they also possess the further excellent advantage of suffering practically no expansion or contraction on being heated and cooled. At the company's stand (No. 62.) there are shown in great variety the bricks and blocks used for withstanding intense heats in many kinds of furnaces, more especially those for steel melting, and for the heat regenerative systems of Siemens and Klonne, as now applied in gas works. Close beside them there are Bessemer tuyeres, nozzles, and stoppers for the ladles used in running Bessemer, Siemens, and basic steel; gas retorts and settings, together with Glenboig "ironstone" clay paving tiles, glazed sewerage pipes, etc. There are also shown specimens of the raw clay and bricks in various stages of manufacture.

In the same district there are also the firebrick works—Heathfield and Cardown—of another well-known firm, namely, Messrs. John Young, Sons & Co., whose stand (No. 71) does very high credit to the exhibitors. It is flanked by two splendid gas retorts, placed on end, which are part of an order now being executed by the firm for the Edinburgh Gas Company. Here and there may be seen samples of clay and bricks in the various stages of manufacture, together with masses of the raw silica rock, which is used by the firm in making some of the specialties on which they place great stress. This silica is obtained from about the center of a "post" of solid rock about 120 feet in thickness, and out of the material in question are manufactured silica bricks, some of which consist of the siliceous material only, with the necessary quantity of milk of lime to cause the particles of silex to fuse together, while others may contain varying quantities—10 per cent. up to 50 per cent.—of fireclay got at the Heathfield works. The bricks made of the silica by itself contain, according to a recent analysis, about 87½ per cent. of pure silica, and about 11¼ per cent. of alumina, the remaining ingredients being peroxide of iron (0.69 per cent.) and potash, with soda (0.61 per cent.) Assuming that the raw material is properly prepared for the manufacturing operations, and that the burning is carefully conducted in the kilns, such bricks can scarcely fail to be possessed of heat-resisting properties in a very high degree. Amongst their other exhibits, Messrs. Young & Co. show many forms of bricks, blocks, etc., for various kinds of furnaces where great heats are employed, including blast furnaces in Scotland, England, and Wales, and the steel melting furnaces of most of the firms in Scotland. Special notice should be taken of the large glazed cisterns which are made by the firm for chemical works, dye works, etc. One of these is shown at the stand, but it is not the largest made, the firm having produced them up to 7 feet square and 7 feet deep, and weighing 4 tons 5 cwt. As to the gas retorts which are made by the firm, we ought to mention that they are now in extensive use in Scotland where regenerative gas firing is had recourse to in heating the retorts.

Another collection of fireclay goods from the same district is that of Messrs. James M'Naughton & Sons, of the Heatheryknowe Fireclay Works, stand No. 64. Generally speaking, they may be said to consist of two groups of exhibits—those on the left side of the stand being chiefly bricks, etc., for furnace purposes, while the other side is in great measure made up of facing bricks, etc. It is only of the former that we are now called upon to speak, and regarding them very high praise must be given. In addition to various forms of blocks and bricks for heat-regenerative furnaces, gas retort furnaces, etc., there are shown some excellent specimens of runner tubes, nozzles, and stoppers for the several steel processes. According to an analysis made in the course of last year, by Dr. John Clark, one of the Glasgow city analysts, the Heatheryknowe fireclay is essentially a compound or mixture of silica and alumina, the respective proportions of those ingredients being 62.15 per cent. and 32.54 per cent. Oxide of iron is set down at 2.21

per cent., the alkalies at 1.57 per cent., and lime and magnesia together at 1.42 per cent. If properly made and fired, bricks produced from such a clay can hardly fail to possess great heat-resisting power. It is worthy of note that these bricks do not crack or break off, but wear or melt gradually and slowly, while still maintaining their first rough and porous appearance throughout.

The Gartverrie Fireclay Company, of Glasgow (stand No. 63), also carry on this industry in what is known as the Glenboig district, some nine or ten miles to the east of Glasgow. Their collection of exhibits is not so large as the others spoken of, but in respect of the quality of their goods the exhibitors have no reason to feel ashamed in the slightest degree, but the very opposite. The firm shows some excellent fireclay bricks and blocks for steel melting and other furnaces where intense heats are generated. They likewise have on exhibition some good-looking silica bricks for standing the highest heats produced in any furnace operations. There are also various interesting specimens of the raw clay, silica rock, and "glass" rock, together with preparations of the same in the shape of mill furnace sand, glass sand, and silica sand for making the bottoms of Siemens steel melting furnaces.

At No. 73 stand, in the same court, the Bonnybridge Silica and Fireclay Company have a most interesting display of goods in that branch of industry, the raw materials for which, however, are worked in the adjoining county of Stirling, not far from the town of Falkirk. Amongst the special exhibits at this stand is a set of bricks for lining a 10-ton steel-casting ladle. This particular collection includes all the sections for the formation of a complete lining. There are likewise a great variety of nozzles, stoppers, and runner bricks, such as are used by most of the leading steel making firms in this country. There is also shown an excellent variety of rock ganister, which is worked by the firm, and manufactured for many of the leading iron and steel works and foundries throughout Scotland and England.

In this department of business the Bonnybridge district is also represented by a first-rate collection of goods shown at No. 60 stand, by Messrs. James Dougall & Sons, of the Bonnymuir Works. This collection contains bricks, blocks, etc., which are made of the finest Scotch ganisters in the market. The ganister in question is of a highly refractory character. The collection includes firebricks, of all ordinary sizes and shapes, blocks, bearers, stoppers, nozzles, runners, flue covers, checked covers, etc. A recent analysis shows these bricks to contain silica and alumina to the extent of 98.29 per cent., the remainder being made up of peroxide of iron, potash, lime, and magnesia.

Messrs. Joseph Cowen & Co., of Blaydon-on-Tyne, near Newcastle, are the only exhibitors in this department from the southern side of the Border, and, so far as we are aware, this is the first time for the Blaydon fireclay goods to be publicly shown in Scotland. At stand No. 61 they make a fairly attractive display of such goods, chiefly gas retorts and firebricks. In respect of the former, they have long had a high reputation, but as regards the latter they do not seem to cultivate that branch of the firebrick industry which, in the hands of the various firms already mentioned, has contributed, in such a marked degree, to make Scotland the chief seat of the Siemens steel manufacture, either at home or abroad. That there has been so little competition, in respect of firebricks, etc., from the English side of the Border, may be regarded by the Scotch manufacturers of such goods as a very high compliment to them, and as an acknowledgment that they have in their hands a branch of trade in which they cannot easily be beaten, as is evidenced by the fact that their customers are very numerous both in England and on the Continent, as well as in Scotland.

In Class IX. (Building Construction, etc.) there are several other firms and companies that show fireclay goods; but, generally speaking, these exhibits are more closely connected with ordinary building work and with drainage and sanitary arrangements than with the construction of furnaces, etc., where intense heats have to be encountered, and consequently, it is not our intention to deal with them at the present stage of our descriptive notices of the contents of the Exhibition.

In a totally different department of the exhibition, Class III., which deals with chemistry, pharmacy, and food, we come unexpectedly on another collection of firebricks, the exhibitors in this instance being the Eglinton Chemical Company (Limited), of Glasgow, whose business primarily is the manufacture of bichromate of potash and various other chemical compounds in which the metal chromium is the characteristic ingredient. It may be remembered that the same company have also established a tanning business in Glasgow, in which they use bichrome in substitution for the ordinary vegetable astringents, such as oak bark, which have been used for generations in the conversion of animal hides into leather. In pursuing their bichromate manufacture the Eglinton Chemical Company use a large quantity of Irish limestone, which they work on a very extensive scale near Glenarm, in County Antrim. As many of our readers are aware, limestone contains numerous nodular masses of flint which have to be very carefully removed, so that it may duly play its part in the production of the chromium compounds. Up till within the last eighteen months or so the flint nodules were a totally valueless and waste material; now, however, the company has been able to turn them to excellent account, having established a very novel and interesting industry, to wit, the manufacture of bricks, the raw material of which is the hitherto useless flints which have gone on accumulating to the extent of thousands of tons during the past five-and-twenty years or so. We shall defer giving a detailed account of this new industry till another occasion, and for the present we must content ourselves with a very few remarks. The flints are conveyed from Glenarm to Coatbridge, where a works has been built and organized by the company specially for carrying on the new industry. After having been subjected to appropriate treatment, the flints are ground to a rough granular powder, which is worked up into a more or less plastic "pug" by the aid of milk of lime and one or two other materials. The resulting product, which is almost entirely composed of silica, is moulded in the usual way, and the bricks are subsequently dried with very great care, and fired in specially devised kilns. Strange to say, there is produced a firebrick whose durability and refractoriness in the most crucial positions in steel melting and other furnaces are something extraordinary. These bricks are shown in various forms at the Eglinton Chemical Company's stand (No. 213, Court 25). The company has also of late commenced the production of what they call chrome and alumina bricks, which likewise seem to possess refractory powers in a most remarkable degree. The chrome bricks have been put to a very severe practical test in Mr. James Riley's patent cupola furnaces at the works of the Steel Company, of Scotland. Later on we expect to be able to give some detailed information about these chrome bricks, and the results attending their use in actual practice. We may then also deal with the alumina and magnesite bricks, and other exhibits which are shown by the company.

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, July, 10, 1886.

Mr. R. P. Spice on "Modern Improvements"—The Claus' Purification Process—Gas Illuminations—How to Make White Sulphate of Ammonia—Value of a Gas Manager's Services—Hawkin's Process of Oxide Purification.

A paper on the interesting subject of "Modern Improvements in the Manufacture of Coal Gas" was read before the Society of Engineers, on the 7th ult., by Mr. R. P. Spice. It is unnecessary to tell American readers that this gentleman proved to be a complete master of his subject. Commencing with the introduction of clay retorts, and the controversy that took place before they were acknowledged to be superior to iron retorts, the introduction of the exhauster was touched upon, and the advantages offered by the "steam jet" form, as compared with mechanical exhausters, were treated at some length. Mention was then directed to the modern method of effecting carbonization by the aid of machinery, a description of West's system being here introduced. Passing on to the subject of dip-pipes and hydraulics, a preference was expressed for the hydraulic seal, rather than any form of anti-dip valve; and it was stated that "Cooper's Process" was a cure for stopped ascension pipes. A detailed description of St. John's apparatus, which Mr. Spice has found to be a preventative of naphthaline troubles, was then given. The work being done by Mr. Valon at Ramsgate, in the matter of regenerative furnaces and tar fuel, having been noticed the author launched upon the subject of "Cooper's Process," and after repeating his well-known arguments in its favor, brought his paper to a close.

As this paper was read on the evening before the commencement of the Gas Institute meetings, several gas engineers from the provinces, as well as most of the well-known Londoners were able to be present; and an animated discussion followed, in which Mr. A. Penny, Mr. G. Anderson, Mr. G. Garnett, Mr. Sugg, and others took part. Mr. Anderson mentioned that he was trying some experiments, on a practical scale, with the "Cooper's Process." Mr. Garnett had found that a good deal could be done to relieve the dry purifiers by slow condensation, and thorough washing of the gas. The paper was necessarily limited, being confined to those improvements that had come under the attention of the author in a professional sense, rather than an attempt to form a complete compendium on the subject. It will also be showed that only plans that have actually been worked on a practical scale are dealt with.

Perhaps this explains why no mention was made of the Claus Process, which is now attracting a great deal of attention. At the recent Gas Institute meeting, Mr. C. Hunt, of Birmingham, read a paper embodying an account of some experiments on a practical scale that have been carried out, certainly with some measure of success with this process, at his Windsor street works. These show that it is quite possible to efficiently purify gas in closed vessels by means of liquids, entirely dispensing with dry purifiers;

and also to reserve some portion of the impurities in the form of salable commodities, such as carbonate of ammonia and pure sulphur. Indeed that portion of the process which relates to the utilization of the sulphuretted hydrogen by converting it into pure yellow sulphur has been in use for some years at the Old Kent Road Gas Works, London. The drawings and models exhibited by Mr. Hunt appeared rather alarming in their intricacy. There are five scrubbers and a catch-tower for the gas to pass through, and a series of light, smaller scrubbers or towers for the treatment of the liquor; and the liquor must, of course, be raised to the top of a tower before it will descend through it, so this process appears to demand a considerable array of pumping apparatus. Further experiments may, perhaps, lead to the simplification of the system by reducing the number of towers required. But this does not detract from the fact that Mr. Hunt, in conjunction with the owners of the Claus Process, has scored a considerable advance; and it is only after careful and extended experiments on a practical scale have been made, that a process involving such a change in purifying procedure can be adopted. I notice with satisfaction that the Corporation of Belfast, whose troubles were referred to in my last letter, have decided to give it a practical trial. The process may be looked upon as a further development of the increase in scrubbing or washing that has become general, and, it must be admitted, that much of the complication above noticed arises from the fact that it combines the utilization of the residuals with the gas purification; and, therefore, to make the comparison between it and the ordinary methods of purification a fair one, we must throw in a sulphate plant and a sulphur oven with the latter. When this is done the Claus apparatus will, perhaps, be the simpler of the two.

The *Gas Journal* calls attention to the part that might be played by gas illuminations in the national rejoicings with which the approaching "Queen's Jubilee" will be celebrated. Gas men who have visited the Colonial Exhibition, and seen the excellent effects that can be produced by the use of an unlimited supply of small electric lights, will naturally have their ideas turned in this direction, especially as a gas illumination on anything like a respectable scale is rather a rare thing in this country. Plenty of stars, crowns, crosses, and such like devices, made of perforated tubes, are to be met with; but not anything in the way of the complete illumination of a large building, or of a design or set piece. These remarks are very apposite, because such an occasion afforded valuable opportunity for *advertising* the gas. It has been the lot of the writer, on one or two occasions of local rejoicing, to superintend the fixing of illuminations. And not only did the undertaking prove profitable at the time, but the order books of the company during the few months immediately following the event, show a marked increase in the way of new customers. Under some circumstances it will be advisable to supply the illuminations at cost price. But if care be taken, in the selection of well-made devices that will not waste the gas, it will be found that a moderate lump sum for each device—such a sum as the consumer will pay with satisfaction, provided that he is supplied with an effective illumination—will cover the cost of fixing and removing, use of pipes, hire of device, gas used, and leave a comfortable margin of profit. So, although no gas engineer is in the position to "push" the use of gas illuminations, it is well to keep a look out, and be ready to utilize the occasion of any festivity or rejoicing, for the benefit of the gas undertaking.

Makers of sulphate of ammonia are sometimes troubled about the color of their product, which, in some localities, seriously affects its market value. From causes apparently inexplicable, the salt, instead of turning out clear and white, may be a dirty gray, or yellowish color. So perhaps after keeping for a few days a distinct blue color is developed. An article published in the "*Moniteur de l'Industrie du Gaz*," after discussing in detail the causes of these troubles, which are due to reactions between foreign substances contained in the sulphuric acid, and in the gas liquor, points out a very simple preventative—the treatment of the gas liquor with an excess of lime. But it happens that the quantity of lime required to combine with the sulphuretted hydrogen and carbonic acid, which will be present in considerable quantity if the scrubbing and washing apparatus is efficient, is proporti nately large. Practically the result is the same as using lime for the removal of those substances in the first place. Unless there is a very pressing demand for white sulphate, or the lime is very cheap, there is no money in the notion. People are often misled by the idea that there is some advantage in washing out the acid impurities, and subsequently removing them from the liquor by lime or other alkali, as compared with the plan of bringing the alkali directly into contact with the foul gas in the first place. They forget that the latter is the simpler and more direct plan, and that the consumption of alkali will be identically the same in either case.

The gas committee of a northern town have gained for themselves an unenviable notoriety by the meagre value they place upon the services of qualified gas engineers, as shown by an advertisement recently issued by them. They need a gas manager for their works (which turn out 150 millions per annum), who must "possess a thorough knowledge of the manufacture and distribution of gas, and be capable of designing and superintending new works, including sulphate plant." The salary they offer in return for these acquirements is the sum of $1,000 per annum. It appears that they anticipated brisk competition for this berth, as the committee take the unusual course of appointing a sitting "for the purpose of interviewing any of the candidates who may wish to see them" *before* the date at which applications are to be sent in. Most gas committees in this country have sufficient sense of honor and justice (I will not go upon the bare ground of business expediency) to treat a manager who earns their confidence with liberality in the matter of remuneration; seeing that in order to be in a position to render his best services he should receive such a salary as will enable him to support himself and those dependent upon him, with comfort and ease, in a manner commensurate with the status of a professional man entrusted with important responsibilities. In this country a man's prestige amongst his fellow-townsmen is very much influenced by the amount he disburses in living expenses; and anyone taking a prominent position, such as the one above indicated, would find great difficulty in keeping within his salary, on the one hand, or avoiding being jeered at as mean and parsimonious on the other. Of course, the committee under notice would say this is not their business, and that they are simply buying human skill and intelligence at the cheapest rate, just as they would buy coal or lime. But the most successful directors, in the long run, are those who treat their employees with consideration, as fellow human beings, and place some distinction between the sale of professional services and the sale of goods on commssion. I shall be sorry if the committee in question are able to number thoroughly qualified candidates—men of experience, ability, and honor—amongst the candidates for their meagre pay. Not so much because it will show that the "penny wise, pound foolish" system is temporarily successful, as that it will furnish proof of the existence of deserving men so far reduced in circumstances as to be powerless against extortionists.

At the Gas Institute meeting Mr. F. Travers gave an interesting account of the results following the adoption of Hawkin's process for the revivification of oxide *in situ* and continuously. This consists in mixing a quantity of air —say from 2 to 3 per cent.—with the gas at the inlet of the purifiers, a small steam pump being used for its introduction. Before passing into the gas main the air is first measured by an ordinary meter, and then caused to traverse a long, narrow box containing baffle plates, partly filled with tar, and maintained at a temperature of about 170° by means of a steam coil. This acts as a carburetter, the air passing in contact with the hot tar becoming charged with vapors of benzol and other volatile light-yielding hydrocarbons, so that the quality of the gas is not affected. It need not be said that the effect of introducing 3 per cent. of raw air would be a considerable depreciation of illuminating power. By means of one purifier only Mr. Travers has been able to accomplish the oxide purification for a period of three months, and the vessel is still in use. Working in the ordinary manner he would have made seven or eight changes during this period; so it is evident that the process saves a considerable amount of labor and nuisance. It is necessary to pass nearly one-half of the total production of tar through the carburetting box, and it is thus rendered unsuitable for tar distillers' use, though not interfered with as regards the other purposes to which tar is applied—such as for fuel, asphalt making, etc. Indeed, the taking off of the volatile matters would rather improve it for purposes other than distillation. At the present market value of tar, however, this is a very small matter. The air meter is taken regularly, so as to be certain that the proper quantity is admitted, which must of course always be a fixed ratio to the make of gas, or rather to the quantity of sulphuretted hydrogen to be removed.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Annual Election, Seneca Falls (N. Y.) Gas Light Company.—The annual meeting of the stockholders in the Seneca Falls and Waterloo Gas Light Company was held on Wednesday, July 14th, at the Company's office Secretary Parrish reported that the business operations of the Company for the fiscal year, ending June 30th, were fairly satisfactory. The ballot for officers for ensuing year resulted as follows: President, C. L. Haskins; Secretary and Treasurer, William Parrish. Directors—C. L. Haskins and William Parrish, of Seneca Falls; Archibald Parkhurst, of New York city, and S. G. Hadley and Edward Fatzinger, of Waterloo. These are all re-elections.

Another Result of the Meeting.—The stockholders of the Seneca Falls gas corporation, however, were not satisfied with the transaction of mere routine business, but determined to take a step forward by granting the gas consumers a dividend in the shape of a reduction in selling rates. The concession allowed is most liberal in its terms, and cannot fail to exert a marked effect upon the future gas output of the Seneca Falls and Waterloo Company. The prior, or existing scale, shows the gross rate to be $3 per thousand cubic feet, prompt payment entitling the consumer to a rebate of 25 cents per thousand; but the new scale, which is applicable to all quanti-

ties registered from date of September 1st, fixes the gross charge at $2.50, while speedy settlement of accounts will secure a rebate of 10 per cent., thus establishing a net sales price of $2.25 per thousand. It required some courage to "cut" charges to the extent above noted, but Messrs. Haskins and Parrish, could they have persuaded the shareholders to view the matter in a proper light, would have made the reduction move at least a twelvemonth ago. Their persistency is at last rewarded, and we congratulate them upon their success. The Seneca Falls *Reveille*, in giving publicity to the Company's action, makes the following comment thereon: "This reduction will place the price of gas within the reach of all, and is a very generous act on the part of the Gas Company. The management of the affairs of the Company has always been in good hands, and the people have been well supplied with good pure gas. It should now meet with liberal encouragement because of its voluntary reduction of the price of gas to so low a figure. It is an old and well-established concern, pays its full share of the taxes of the village and town, and is decidedly a home institution." Verily, the Editor of the *Reveille* is most unlike the average journalist, at least when the said "average" dilates upon the doings of the gas suppliers.

It is Like All the Rest.—One who signs himself, "An Old Subscriber," on a postal card bearing the official defacement stamp of the Galesburg (Ills.) Post Office, asks us to state, through the Journal, what sort of arrangement or method of making gas is followed by those who control the Jerzmanowski process. In answer thereto we may say that it is in reality but a modification of the process now in use at the Municipal, New York, and Knickerbocker stations of the Consolidated Gas Light Company, of this city. It is essentially based upon the discoveries or adaptations of the late M. Tessie du Motay, who was probably the most studious of investigators in the water gas field. In so far as we can learn, the Jerzmanowski system is much more complicated or intricate than the plan evolved by Tessie du Motay, and presents no features which would entitle it to precedence or superiority over the latter's method of working. In short, the Jerzmanowski process is a water gas pure and simple. Its manipulators claim that but a comparatively small percentage of carbonic oxide is contained in the finished gas product; but analysis figures show that the gas sent out by the Equitable Gas Light Company, of this city, (where the Jerzmanowski system is in use), contains over 20 per cent. of that deadly poison. It may be safely asserted that the Jerzmanowski plan presents no features calculated to give it prominence over other water gas systems; in fact, on the contrary, it would decidedly suffer were it to be compared with some of the others of these now in vogue. Coal gas, intelligently manufactured, may be counted upon to lead all its competitors, no matter by what names such competitors are designated.

Cheaper Gas for Darby, Pa.—The propietors of the Darby (Pa.) Gas Light Company, taking heart of grace, have reduced their selling rate to $2 per thousand cubic feet. Perhaps this may be included amongst the list of "horizontal" reductions, since the old schedule figure was $3.

Perhaps This Might Explain It.—It is a matter of record that all things are explainable in some sort of way; and consequently it is possible the Darby "horizontal" reduction is to be accounted for on the ground that the Darby folks are now making coal gas. They did try other sorts, you know; but are at last on the right track. Mr. C. F. Cattell, Superintendent of the Company, is tired of experiment with carbonic oxide mixtures, and will hereafter confine himself to the sale of a staple gas product.

Still Selling Gas.—The Rutland (Vt.) electrical promoters had an idea that when their electric lights went into operation the gas folks would have to shut up shop. Let us see how near to the mark they were. About as near as this: The books of the Peoples Gas Company, taking the 30 days of last June as most likely to make a good showing for the electricians, the fact is disclosed that the gas folks were paid for 100 cubic feet less gas in June, 1886, than was the case for the corresponding days of 1885. The Rutland electricians will have to hurry along faster than that if they want to make good their predictions. Still, the light-of-the-future men dont worry greatly about the distance which intervenes betwixt fact and fancy.

Cheaper Gas for Macon, Ga.—Mr. A. E. Boardman, who is ever on the alert, as Treasurer and Superintendent of the Macon Gas Light and Water Company, to advance the fortunes of that dual business enterprise, informs us that he has made another "strike at the public purse," although we suppose the strike is not to be included under time-stained heading of "another Southern outrage." At any rate our readers may be trusted to place the responsibility where it really belongs when they will have investigated the following: On July 3 the directors of the Company resolved to empower Mr. Boardman to state that on and after the first day of next October a discount of 10 per cent. would be granted on the bills of all consumers whose meters registered a monthly consumption of less than 10,000 cubic feet. This discount is increased to 20 per cent. where the monthly consumption is shown to be over the quantity above designated. The discounts take effect only in consideration of prompt appearance at the Treasurer's office; but this does not imply that the consumer needs to be as fast a sprinter as the American champion short distance runner, Mr. L. E. Myers, since ten days are allowed wherein to make the journey. Five years ago the Macon consumer had to pay $5 per thousand cubic feet for his gas supply—something entirely different from the coming October schedule of $2 and $2.25; and hence we may be excused for suggesting that his last state is better than his first. Mr. Boardman promised to do this; and even that grumpy "former of public opinion," the Macon *Telegraph*, is forced to admit it is "glad to witness and record this spirit of liberality on the part of the Company," which "all had heretofore regarded as a grasping monopoly." In fact the same authority thinks it can see "ample promise for encouragement on the part of the people." Still, the grumpily constituted quill driver is afraid, "although we [we presumably stands for the people] growl at the size of our gas bills, and expect to continue to do so, we are willing that the Gas Company should make a fair profit on its business,"—there's public spirit, to be sure—"and hope that the profit will increase so that a further reduction in price will soon follow." To which, no doubt, Treasurer Boardman responds with a fervent "Amen." The *Telegraph* man ought to pattern after his brother of the Seneca Falls *Reveille*, and cheerfully acknowledge that the local gas suppliers have fairly and squarely kept their covenants. Mr. Boardman states that he is busily engaged in the work of relaying the services, with the intention of keeping down the unaccounted-for gas charges. He is putting down tar-coated (externally) pipe, the tar being laid on while hot. The water-supply branch of the Company's business is rapidly extending; and, what with one thing and another, Mr. Boardman is having a rather lively time of it. Perhaps it would be just as well to hint that a man *can* overtax himself; and his experience of last winter should convince him that Nature will assert herself. However, his present activity furnishes abundant guarantee that "Richard is himself again"—a state of affairs sure to give gratification to his brother gas men.

The Consolidated Gas Company's (Balt., Md.) Election.—The sixth annual meeting of the stockholders of the Consolidated Gas Company was held on date of June 19. The election resulted in the choice of the following: President, John W. Hall; Vice-President, L. R. Smoot; Treasurer, Chas. F. Peregoy; Directors, Bernard Cahn, John S. Gilman, Walter B. Brooks, Wm. Sinclair, and Austin Jenkins. As far as we can see, no change has been made in the management of the Company.

High-Power Gas Burners Do Compete with the Arc Light.—At the last meeting of the American Gas Light Association Mr. Stein, of the Siemens-Lungren Company, of Phila., Pa., propounded a query as to whether high-power gas burners could successfully compete with the arc lights in the matter of street illumination. In his paper on the subject Mr. Stein submitted facts and figures to prove the affirmative side, and a most convincing array of testimony was made thereon. If further proof were needed we would offer the following as such proof; but the statement is not so presented. In fact it is submitted as an illustration of the extension of the system (which had previously been tried and reported favorably upon) of employing high-power gas burners for the illumination of the public squares of the Quaker City. Indeed, so favorable were the results obtained from the specimens already operated, and of which mention has been made in these columns, that the sub-committee of the Gas Trust committee on distribution, at a meeting held July 15, ordered the placing of a total of 95 Siemens regenerative lamps, to be apportioned over the different public squares of the city in accordance with the following allotments:

Jefferson Square	.....	16 lamps.
Passayunk "	.....	16 "
Norris "	.....	18 "
Washington "	.....	23 "
Independence Square	.....	21 "

Also one lamp on the northeast corner of Twentieth and Tioga streets. This is, we believe, the most signal victory achieved in the introduction of high power Siemens burners in any city in the world, remembering, of course, that the contract for their erection and maintenance was awarded by the agents of a municipalty. It has always been a mystery to us why the city of Richmond, Va., did not adopt the Siemens high power burners for street lighting use, instead of adopting the arc lights. If Philadelphia can see her way clear to adopt the system with profit and efficiency, Richmond should not hesitate for a moment. Perhaps the Lighting Committee might be induced to look the matter up; and should they see fit to make the investigation, we think the days of the Schuyler Electric Lighting Company's contract at Richmond would speedily be numbered.

How They Propose to do it.—According to the Boston *Daily Advertiser*, the directors of the Waltham, (Mass.) Gas Light Company have voted to establish an electric lighting plant at an estimated cost of $20,000. Circulars will be issued for the purpose of convening a meeting of the stockholders, to be held July 28th, to ratify the action of the directors. Although the bill authorizing gas light companies to operate an electric lighting plant in conjunction with works for the supply of gas failed to pass the Legislature, the Waltham directors claim, acting under the advice of excellent counsel, that the existing laws allow of their doing this, providing *all* the stockholders assent thereto. This, of course, will be somewhat problematical, since it sometimes happens that even dividend checks cannot in *every* case be mailed to the proper recipients. It is a decided pity that the Massachusetts gas companies did not join hands last winter with Mr. W. Eliot Fette, when that gentleman proposed to have the law amended, and when sufficient time existed to have such course pursued. Of course, it must be understood that the Massachusetts Legislature failed to pass the measure presented late this spring simply because time did not permit of its proper consideration; and to the credit of the Massachusetts lawmakers be it said—they are hostile to crude legislation. The Waltham gas men are anxious to act in the premises because it is proposed—in fact the company is now in process of formation—to establish an independent local electric lighting corporation. The executive management of the Waltham Gas Light Company consists of Messrs. L. Clark, G. A. Stearns, A. T. Lyman, J. R. Farnum, and J. B. Gooding.

He Gives Them a Year.—Mr. C. H. Dieffenbaugh, of the Tyrone (Pa.) Gas Light Company, informs us that a syndicate of speculators is responsible for the formation of the Home Electric Light Company, of Tyrone, Pa. The concern is capitalized in the sum of $16,000. The promoters are erecting the station, and putting down (or up) the plant. The Westinghouse incandescent system is to be operated. The managers, in response to an invitation from the authorities, bid for and received a contract for the public lighting of Tyrone, under the terms of which the contractors agree to maintain and light a total of 60 lamps, on every night and all night, for the lump sum of $1,000 per annum. It is proposed to charge private consumers the following rates—each lamp being guaranteed equal to a lighting value of 16 candles: Seven lights, or less, $7 each per year; eight lights, and over, $6 each per year. Mr. D. views the proceedings with much equanimity. He says: "It is an unlimited company with a limited amount of cash, and before one year of its life is recorded some one will get badly squeezed." Mr. D. evidently has no fear that the gas folks will suffer from the "hug."

Exportation of Westinghouse Steam Engines.—The Westinghouse engine seems destined to become as popular abroad as it is at home. Recent shipments of this favorite pattern have been made to Cuba, Paris, Rotterdam, Mexico, and Russia.

Cheaper Gas for Trenton, N. J.—On July 12th the directors of the Trenton Gas Light Company notified the gas consumers that the future charge would be $2.25 per thousand cu. ft. No official notice of the concession has been sent us; but we presume the statement is authentic.

The Hopper Automatic Governor.—Mr. T. C. Hopper meets with continued success in the placing of his automatic governors. In June last the following shipments were made: Cincinnati (Ohio) Gas Light and Coke Company, one 16-inch; Hyde Park (Ills.) Gas Light Company, one 12-inch, with bye-pass complete; 8-inch governors were sent to the gas companies at West Chester, Pa.; Birmingham, Ala., and Huntsville, Ala.; and a 6-inch to Lansing, Mich.

Change in Ownership of the Galena (Ills.) Works.—Mr. W. A. Bixby, who in reality has for years been the power behind the throne in the management of the Galena gas plant, is now sole proprietor of the same. The transfer was made early in July. The works are in good condition, and may be counted upon to satisfy every requirement of the gas consumers of that place. Furthermore, Galena's residents are to be congratulated upon the fact that Mr. Bixby is to continue in command of their lighting supply. He is a straightforward, energetic business man, and is bound to succeed.

What the Denver (Col.) Electric Light Men are to Receive.—Our "item" columns of July 2d contained a reference to the lighting value evolved from the rated 20-candle power electric lamps that illuminate the streets of the heart of Colorado. Other tests besides those there given have since been made, with similar results—*i. e.*, the nominal candle power called for under the contract has not been furnished. The contract calls for a lighting duty of 20 candles; whereas the tests reveal an actual average value in the lamps maintained of only 9 candles. At a meeting of the Board of Aldermen, held July 8th, this non-fulfillment of contract provisions was discussed, and the debate led to the passage of a resolution which deducted 33⅓ per cent. from the electric lighting company's bill presented on account of the June service. Why was not 50 per cent. deducted? It certainly should have been.

Gas is Good Enough for the People of Rockford, Ills.—The Fort Wayne Jenney Electric Light manipulators have been pestering the authorities of Rockford (Ills.) to purchase a mast arc lighting plant (to include a 150-horse power engine, dynamos, wires, and four or five towers or masts) valued at $30,000. One or two of the "city fathers" looked with favorable eyes on the project, but common sense finally prevailed. Mr. Butterworth submitted, on behalf of the Rockford Gas Light Company, a proposition to light the city's lamps (on the basis of a three years' contract) for the sum of $24 per annum each, and this proposition was accepted—the lighting committee of City Council was unanimous on the subject. The contract is now in force.

Not a High Rate, Either.—The Charlotte (N. C.) Gas Light Company offers to light the city's street lamps for the sum of $25 each per annum. A cheap rate.

Cheaper Gas for Syracuse, N. Y.—As a sequel to the vote of confidence passed by the Syracuse Common Council, on the management of the Syracuse Gas Light Company (when the former, on date of June 7th, refused to grant a charter to the manipulators of the fortunes of the Equitable Gas Light Company, of the United States), we are enabled to state that the directors of the old company, at a meeting held June 12th, decided to reduce selling rates. Secretary Babcock's official announcement was made on July 23d, and from it we learn that ordinary consumers, from and after first day of September, will receive their gas supply at a uniform charge of $1.50 per thousand. The city will pay $1.40. It is needless to add that Mr. A. C. Wood is primarily responsible for the action taken, which, in fact, is but a continuation of the course advocated and practiced by him for many years. Those who appreciate the difficulties, in the item of adverse soil surroundings to a large portion of the Syracuse Gas Company's distributing mains, will concede that Mr. Wood "knows a thing or two" when he can urge his directors to sell gas at the above named figures, and at the same time guarantee the shareholders a substantial return on their investments. Indeed, the President-elect of the American Gas Light Association has always been in the front rank of the fraternity, and there is where he proposes to remain.

Sale, at Auction, of the Consumers Gas Company of Chicago.—On July 15th, in pursuance of a decree made by the United States Circuit Court, on May 22d, Mr. E. B. Sherman sold the entire plant, good will, etc., of the Consumers Gas, Fuel and Light Company, to Mr. Jno. T. Lester, who, it is presumed, acted on behalf of the Cummings-Kent-Reyburn syndicate. The consideration received was $1,946,000. It looks as though some of the ground-floor stockholders are to be immured in the cellar; and thus does the "innocent shareholder" become convinced that "things are not always what they seem."

The Dynamos were Burned Out.—A Jersey City (N. J.) house mover, named Costigan, on the night of Friday, July 16th, made his hauling tackle fast to a telegraph pole. The strain canted the pole, and several of the wires which it carried were broken. Among the latter were some belonging to the electric light company. The rupture resulted in the extinction of 41 arc street lights dependent upon the destroyed circuit. Another consequence was the total destruction of a Ball dynamo and armature valued at $6,000.

Killed by the Electric Current.—Theo. Miller, a resident of Albany, N. Y., on the night of July 20th received a shock from an electric light wire which proved instantaneously fatal. Miller was only a youth of 13 years, and had, in company with other youngsters, been in the habit of making "experiments" on the electric wires feeding the arc lamp at the corner of Ninth and Adams streets.

Annual Meeting, Burlington (Vt.) Gas Company.—At the stockholders' meeting, held July 5th, Mr. J. D. Hatch was chosen President, Mr. F. H. Parker was re-elected to fill the triple duties of Secretary, Treasurer, and Superintendent. The Burlington Company reduced selling rates on June 1st. A sliding scale is in vogue, with minimum net charge fixed at $1.90. The maximum figure is $2.70.

A Gas Company Reorganized.—We note that the Beverly (Mass.) Gas Light Company has changed hands—and for the better, beyond doubt, since Mr. C. F. Pritchard, of Lynn, Mass., is one of those who will hereafter have a voice in its management. Messrs. J. I. Baker, D. W. Quill, A. W. Rogers, and S. W. Winslow are associated with him.

The Rutland (Vt.) Company Chooses Directors.—On July 19th Messrs. W. B. Mussey, J. W. Cramton, J. A. Sheldon, J. N. Baxter, S. M. Wilson, and E. D. Keyes were elected to serve as a board of directors to the Peoples Gas Company, of Rutland, Vt., for the ensuing year. Considerable new work is being done on the plant.

Notes from the West.

BY RETORT.

The gas fraternity have been waiting to hear from the Committee on Edison Electric Light at Cincinnati, Ohio, and are now rewarded for their pains.

It will be remembered the two Cincinnati Boards appointed a Committee of four aldermen and three councilmen as a special committee on electric lighting, more especially to consider the ordinance of the Edison Electric Company which was then pending, and which gave the electric company the privilege of possessing the lamp-posts and utilizing them for a period of ten years for the lighting of the city's streets by incandescent electric lamps instead of gas. The first meeting was held June 29th, and those who read the proceedings of that session, as reported in the Cincinnati papers at the time, very keenly appreciated the able manner in which General Hickenlooper handled his case and his would-be rivals; but the session then was as child's play compared to the one held Thursday, July 22d. In it the General displayed the wonderful ability with which he is endowed of completely exhausting his opponents and exposing their philanthropical (?) efforts for the public good. The history of the Cincinnati Gas Company is a worthy monument to any man's memory; but it has no page so brilliant or lasting as that contributed by General Hickenlooper in his marvellous success in protecting its interests from the hands of blackmailers. In a former fight, when a few benevolent (?) citizens, under cover of cheap gas, sought admission to Cincinnati, they were utterly routed by the argument prepared by the General, and which was so complete and exhaustive that to this day it is *the* weapon of defense used in almost every other gas conflict, and has been worth thousands of dollars to the gas investments of the country. We hope the full text of the argument used in the electric light contest may exhibit the same care in preparation and prove as efficient in future conflicts. I give the gist of the argument below; and, though long, it is "mighty interesting:"

General Hickenlooper addressed the special committee at considerable length on the subject before it, hinting at first at the difficulty under which a novice must necessarily labor in presenting a clear and comprehensive view of the objects and purposes of the promoters of the electrical enterprises, with which the public at large are comparatively unfamiliar, and around which for years has been thrown the sacred glamour of "America's most wonderful achievement," to disparage which is regarded by many as little less than high treason. He proposed, however, to dispel the glamour, clear away the embarrassing technology, and come down to the plain business propositions involved in the question. He held that it would neither be right, just nor lawful to favorably consider the ordinance now before the committee, because that there is nowhere in existence a valid ordinance such as the one which has been falsely represented as forming the basis of the Gas Company's contract. The only one which has ever been legally passed, accepted, acted under or comformed to, is the ordinance of June 16, 1841, known as the Conover ordinance, granting to James F. Conover, his associates, their heirs, assigns and successors the full and exclusive privilege of using the streets, lanes, alleys, etc., of the city, for the purpose of conveying gas, for the term of twenty-five years (afterwards extended), and thereafter until the same (gas works, etc.) shall be purchased by the City Council. While it may be claimed that the exclusive character of the grant applies only to the distribution of gas, and thus serves only as a bar to the introduction of another set of mains, etc., it certainly cannot be questioned that it formed the principal consideration of the contract which, not having been terminated by a purchase of the works, still remains in full force and effect. The obligations of both parties are mutual and clear, the one to deliver, and the other to receive gas for lighting the city. The recent decision of the U. S. Supreme Court in the Louisville and New Orleans gas cases, probably the most important ever passed upon affecting the gas interests of this country, clearly establishes the broad principle that exclusive privileges of this kind are not liable to the objection that they are mere monopolies, but are franchises which may properly be granted by the State or municipality in consideration of the performance of a public service, after the performance of which they become contracts, protected by the tenth section of the constitution.

General Hickenlooper then proceeded to review the statements and representations of the several parties representing the electric light ordinance, to show that those statements and representations are not worthy of confidence. He quoted from stenographic reports of the former or preceding meeting of the committee to show, first, how direct answers to plain business questions were evaded in such language as "We do not consider that question pertinent," "I decline to answer," etc. Then he touched up Mr. Hammerer, the representative of the New York Electric Light Company, who informed the committee that he "had the pleasure in assisting in the installment of the first system ever inaugurated, and that was the Holborn Viaduct, London."

"Hickenlooper—You spoke of placing under your own personal supervision the Edison lamps in Holborn Viaduct. Are they still there and in use?"

"Hammerer—Yes, sir, they are, as I understand from quite recent advices. I was formerly chief engineer of the Edison Company, and, according to my best information, they have now three thousand electric lights and probably more than that burning on the Holborn Viaduct. The company erected this plant as an exemplification of what the Edison light was. We intended to give it up there and locate it by the 'Strand,' but the proposed removal created so much excitement that they brought it before Parliament, and we were compelled to continue it and I think are running it now."

"This delicious morsel of falsehood cut out of almost whole cloth General Hickenlooper held up to the light by documents and publications quoted by him. The Holborn Viaduct was first lighted with 'arc' lights during the year 1878, but ceased to be so lighted early in 1879. An editorial in the London *Metropolitan*, March 15, 1879, said that 'the trial of the electric light on Holborn Viaduct has now been brought to a close, the immediate result, so far as the public are concerned, being that this mode of illumination has at present been found too costly to justify its continuance. This is the statement put forward on behalf of the Commissioners of Sewers, who are responsible for the lighting of the thoroughfare in question; and we are quite prepared to say that under the circumstances they could not well have adopted any other course, as it has proven *seven times* as expensive as gas.'"

Two years later the "Edison Electric Light Company" then undertook to light the viaduct, but with what success is seen by the London *Journal of Sanitary Improvement*, of June 26, 1883, detailing in review the report upon the Edison lighting for the year ending April 24 of that year. The total capacity of the generators was 3,650 lamps, while the report states that only 92 public and 745 private lights were supplied by the company. The installation was confined to 466 yards of the viaduct, or about 1,240 square yards in area (about the distance from Central avenue to Vine street). By agreement, the cost of lighting was to be the same as gas. As with other systems of electric lighting, failures were reported by the police. The total failures were 815, and their aggregate duration was 1,515 hours of one lamp.

Unfortunately all the stoppages occurred in the busiest part of the afternoon or evening, and private users suffered at the same time. "All those failures occurred on one thoroughfare extending only about a quarter of a mile in length, with the station in the middle, with a constant supervision at headquarters, and a watchman always on his rounds with a supply of new lamps. These are awkward facts for the partisans of the so-called 'only perfect and reliable system.' The first query must be: What is the Edison Company losing by this experiment; and secondly, how long will it last?"

Six months later the end was reached, as an editorial (same paper) of January 15, 1884, shows:

"The subscribers to the great Edison electrical lighting installation on the Holborn Viaduct have received a courteous intimation from the secretary of the 'Swan & Edison Company' to the effect that the supply will soon be terminated, and they are therefore requested to inform the company when it will be convenient to have these services cut off. Thus ends the enterprise from which so much was expected, and which has done so little beyond keeping itself in existence at a cost that will never be revealed. * * * The subscribers who went to the expense of adapting their interior fittings for the Edison system will of course lose their money, which will constitute their reward for the enterprising spirit they displayed and the patience with which they endured the occasional eccentricities of the light."

In view of all this General Hickenlooper said that after the statement of Mr. Hammerer he could hardly believe his own eyes and ears. The committee heard the gentleman's statement about the Holborn Viaduct installation with their own ears, so after that hearing he sent the following cablegram to a responsible party in London:

"CINCINNATI, June 30, 1886.

"Is Holborn Viaduct now being lighted with 3,000 or any other number of incandescent electric lights?"

To which the following answer was received:

"LONDON, July 1, 1886.

"No, sir; discontinued two years ago. See Haywood's report, April last."

He obtained a copy and quoted this: "The contract with the Edison & Swan Electric Light Company terminated on July 24, at which time electric lighting of Holborn Viaduct was discontinued and the gas-lighting resumed."

So much for the credibility of Mr. Hammerer. General Hickenlooper next directed attention to Mr. Worthington, who appears to be the directing head of the proposed enterprise, which he says has proven eminently satisfactory and profitable elsewhere. He showed from the stenographic reports of the gentleman's statements and from copies of the contract and agreement for electric lighting in Circleville and Middletown, quoted at great length, that he was either ignorant of or purposely evaded questions intended to bring out the facts about electric lighting in those places. For instance, he stated all-night lighting, while the contract stated moon schedule. The point of evasion was that if they received $22 under a contract for "moon schedule" it would be equivalent to $37.18 under the Cincinnati time-table ($14.87 more per post than is now being paid here), and that where they did light all night at Middletown they charged $40 per post, and not $22 as they stated. And yet at these extravagant rates of compensation they were not only unable to pay dividends, but could not meet current expenses.

And these are the gentlemen who propose to light the streets of Cincinnati cheaper than gas, and make everybody rich and happy besides.

Mr. Joseph Kinsey, as completing the interesting trio of electrical light evangelicals, was next passed under review. It may be remembered how indignant he was at Hickenlooper's suggestion that the obtainment of the franchise was for the mere purpose of peddling it out again. The new thing about

Mr. Kinsey, developed yesterday, was the following letter, written by him privately to Hickenlooper, although at the preceding meeting he positively disavowed having done so:

"CINCINNATI, October 30, 1884.

"General A. Hickenlooper, President Gas Co.:

"DEAR GENERAL—Referring to the conversation had with you, we will endeavor to secure and turn over to you:

2,420 shares, on which five per cent. has been paid,
200 shares full paid up stock,
1,580 shares retained by trustee, nothing paid on same,

4,200 for the sum of $20,000.

"The parent company holds 1,800 shares full paid stock for the franchise, which covers Hamilton County, O., and Campbell and Kenton Counties, Ky., for the life of the patents and all renewals of same.

"With this stock in your hands you absolutely control the company, and it could not be closed out without taking care of the two hundred shares full paid stock, par value $20,000. Yours truly, POST & Co."

"And now gentlemen of the committee," as a last shot at Joseph, General Hickenlooper said, "I leave it with the committee to determine as to the pertinency of my questions, and whether there was any justification for this indignation over the mere suggestion that after the acquirement of such a 'franchise' it might be held for speculative purposes."

Reverting to Mr. Worthington's statement that "Harrisburg has now four thousand lamps by contract," the General read the following telegrams:

"CINCINNATI, July 8, 1886.

"How many Edison incandescent public lamps are in use in Harrisburg?"

Answer:

"HARRISBURG, July 8, 1886.

"Only those in Capitol Grounds, *about two hundred*. The city has none.

X."

This "whopper" was followed by others no less striking in character by the veracious Hammerer, who said of Denver, Col., that "it is the largest plant of this particular kind. We have there about sixteen thousand lamps in use." The General, quoting from item five of the contract, showed that the specified number was about four hundred and fifty! It would thus be seen that those gentlemen reverse the usual order of things. When at a great distance, presumably out of reach, they are exceedingly large—forty diameters; but when we get up close, they diminish and become very small.

These contradictions and inconsistencies, to call them by no worse name, when brought out with such distinctness, amused and deeply interested the committee and all present at the meeting. It would be tedious to enumerate them any further, but there was no mistaking the effect produced.

General Hickenlooper then proceeded to show that the character and photometric value of the light which the ordinance proposes to furnish is not what the parties have represented it to be, and on this he was both clear and specific, sustained by scientific tests made in this city by Prof. Thos. French, Jr., of the Cincinnati University, assisted by post graduate R. A. Moorman, and then quoted copiously from "testimonials" from prominent citizens of Middletown, O., which, to say the least, were very damaging. The same may be said of quotations from Denver.

He showed that the practicability of successfully and satisfactorily operating such a plant as the Electric Light Company propose has nowhere been demonstrated; but, upon the contrary, past experience and all accessible information clearly indicate that the light is liable to interruption and sudden and unaccountable extinction. In this city alone, in a ninety days' trial, it failed twelve times in the Front street pumping station, and gas had to be resorted to.

During an additional thirty days' trial gas was turned off at the meter and the dynamo was run continuously for twenty-four hours per diem, during which it failed four times.

He showed that the exposition paid for "Arc" lights $1,650, and for "Incandescent" $4,415, while the consumption of gas was reduced but $487.50 below the average paid for the four years previous.

General Hickenlooper next touched upon the dangers to both life and property from electric light wires, and gave many instances in proof, although the electrical gentlemen speak of the "harmless character of the current used by them," yet in their own pamphlet they insert the following caution, printed in italics:

"The current used in this system is of high tension (1,000 volts), which would be unsafe to introduce into dwellings, stores or buildings of any character where the wires and sockets are liable to be handled by inexperienced persons."

He showed that no incandescent electric light company in the world ever paid running expenses selling electric light at an equivalent of the price charged for gas in this city, and that, therefore, the price at which this company proposes to undertake such service is totally inadequate, clearly indicating gross ignorance of the character of the undertaking or hope of profit in some other direction.

Finally, General Hickenlooper showed that from the "promoters'" standpoint all things are lovely: Stock issued, $30,000; that within a few months after organization a bonded indebtedness of $10,000 was incurred, and that subsequently, only a few months since, an additional $15,000 was borrowed, making the total contribution of stock and bondholders $55,000. And what remains to show for it?

The assessed valuation of their real estate is $4,000, and less than one month ago their secretary, L. Abt, made oath that the total moneyed value of all their lines, machinery, apparatus and other assets, including cash on hand, was but $1,900, thus showing that during less than two years' operation the sum of $49,000 has apparently disappeared from view, in consequence of which interested parties might well be excused for taking steps to ascertain the financial responsibility of present stockholders.

Should a company be formed in this city on the proposed "million dollar basis," and before recited precedent be strictly followed, at the end of two years the account would stand as follows:

Real estate, per appraisement	$72,727 27
All other assets, including cash on hand	34,545 45
Deficiency to be accounted for	892,727.28

In conclusion, General Hickenlooper said that he thought he had pretty clearly shown:

First.—That the alleged corporation seeking this franchise has no legal existence.

Second.—That the responses to all inquiries looking to a disclosure of the identity of the parties who are to operate or use such franchise have been misleading and evasive.

Third.—That little or no confidence can be placed in the statements and representations of the promoters of this electrical enterprise.

Fourth.—That while they have asserted their intention of investing $1,000,000 in the undertaking, so far as you have been able to ascertain, not one dollar has ever been contributed for such purpose.

Fifth.—That the so-called "sixteen-candle power lamp" does not average and cannot be made to continuously give one-half the light you are now receiving.

Sixth.—That this system of illumination is peculiarly liable to frequent interruption, sudden extinction and total destruction.

Seventh.—That nowhere in the world has a plant of this size and character ever been operated, or even organized, for street lighting purposes.

Eighth.—That in not to exceed half a dozen places have the Edison lamps been used for exterior illumination, and then only to a very limited extent, and in every such case have proven unsatisfactory or a total failure.

Ninth.—That in only two places in the State of Ohio have they been so used, and in both these places, after a full, fair and impartial trial, they have been discarded.

Tenth.—That no regularly incorporated Edison Electric Light Company, in this or in any other country, has ever paid running expenses by selling "incandescent lights" at an equivalent of the cost of gas used in the public lighting of this city.

Eleventh.—That the price at which they propose, on the face of the ordinance, to execute this work is less than one-half the compensation received at other places where they have failed to pay running expenses.

Twelfth.—That while they have represented that their price is one-sixth or sixteen per cent. less, when the "provisions" and "conditions" of the proposed ordinance are fully considered, it will be found that the cost to the city will be no less than you are now paying, but liable to be very much greater.

Thirteenth.—That, considering the facilities already afforded by the establishment of two electric light companies, the granting of similar franchise to another would be but an uncalled for authorization of additional obstructions on the streets, and in increased danger to life and property.

Fourteenth.—That the "franchise," if granted, will in all probability never be operated, but be held and used only for stock-jobbing, bond-selling or other speculative purposes.

Fifteenth.—And, finally, that the city is already committed to a valid and binding contract for the performance of this same service, the conditions and obligations of which contract have been mutually observed for a period of *forty-five years*, and under which the streets of this city have been continuously and satisfactorily lighted *without the record of a single default*, except that occasioned by the flood of 1883-4, a repetition of which calamity has been rendered impossible by the erection of the "East End Station," above the highest flood line ever known.

Under these circumstances he thought that the interests of the citizens of this city will be best subserved by a rejection of the ordinance presented for consideration.

The committee then arose, and by agreement will meet again subject to the call of the Chair.

THE AMERICAN
GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

Editor—JOS. R. THOMAS, C.E
Manager—C. E. SANDERSON.

PUBLISHED ON THE 2ND AND 16TH OF EACH MONTH
At No. 42 Pine Street, New York.

This is a recognized official organ of—
LIGHT, HEAT, STEAM, WATER-SUPPLY,
VENTILATION, SANITARY IMPROVEMENT,
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MONDAY, AUGUST 2, 1886.

NOTWITHSTANDING the attempt to inaugurate a strike at Hon. W. L. Scott's Ocean Mines, that colliery has continued to forward coal to Baltimore regularly since the men resumed work on the 10th of July.

The Market for Gas Securities.

The city gas share market during the fortnight has presented marked symptoms of the manipulator's art. Attorney-General O'Brien's decision, made public on July 27th, sustains the Consolidation at every point, and possibly we now have heard the last of the Sherwood party's bearing attempts. At time of writing Consolidated is bid for at 81¼, but the market for real sales is at a standstill.

Brooklyn shares are in an unsettled condition, although indications point to an increase in values in the near future.

At auction, we note 131 shares Consolidated, city at 81⅞; 50 shares Metropolitan, Brooklyn, at 83; and 50 shares Peoples, Brooklyn, at 71.

The Chelsea (Mass.) Gas Light Company has declared a dividend of 2½ per cent. The annual meeting of the Chicago (Ills.) Gas Light and Coke Company will be held on the seventh of this month; and the transfer books will remain closed between dates of 1st and 7th inst.

Consolidated, of Baltimore, is active and stronger, our advices of Thursday showing a bid price of 54.

An important move has been made in Havana gas matters. It is matter of record that the Havana Gas Light Company has merged its interest with that of the Spanish-American Light and Power Company, and bears the name of the "Spanish-American Light and Power Company, Consolidated." The capitals of the respective companies were scaled down 40 per cent., or, in other words, the new combination possesses a capital of $3,000,000. The business of the company will be transacted in this city and Havana. The trustees are Messrs. T. J. Hayward, J. del Calvo, W. H. T. Hughes, P. B. Olney, R. A. C. Smith, W. S. Johnson, H. H. de Forest, O. Adams, J. C. Bradley, and H. J. Cullen, Jr. This is a strong organization, and may be counted on to "boom" things.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks,
16 WALL ST., NEW YORK CITY.

AUGUST 2.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	81¼	81½
Central	440,000	50	—	—
" Scrip	220,000	—	47	57
Equitable	2,000,000	100	116	120
" New Stock			150	155
" Bonds	1,000,000	—	113	115
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	113	—
Mutual	3,500,000	100	111	113
" Bonds	1,500,000	1000	104	107
Municipal, Bonds	750,000		—	—
Northern	125,000	50	—	—
" Scrip	108,000			
Yonkers		50	51	55
Richmond Co., S. I.	300,000	50	60	—
" Bonds	40,000	—	—	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	111	113
Citizens	1,200,000	20	69	72
" S. F. Bonds	320,000	1000	106	110
Fulton Municipal	3,000,000	100	151	153
" Bonds	300,000		104	108
Peoples	1,000,000	10	70	72
" Bonds	290,000	—	106	107
" "	250,000	—	103	—
Metropolitan	1,000,000	100	82	85
Nassau	1,000,000	25	114	116
" Ctfs	700,000	1000	101	102
Williamsburgh	1,000,000	50	133	—
" Bonds	1,000,000	—	112	114
Out of Town Gas Companies.				
Buffalo Mutual, N. Y.	750,000	100	85	90
" Bonds	200,000	1000	95	100
Citizens, Newark	918,000	50	130	140
" " Bonds	124,000	—	105	110
Chicago Gas Co., Ills	5,000,0000	25	128	135
Peoples G. L. & C. Co., Chicago, Ills	3,000,000		8	12
Cincinnati G. & C. Co.			190	194
Consolidated, Balt.	6,000,000	100	54	—
" Bonds	3,600,000		107	107½
Chesapeake, Balt	1,500,000	100	73	75
"	1,000,000		100	102
Central, S. F., Cal			70	72
Capital, Sacramento, Cal.			54	56
Hartford, Conn	750,000	25	140	142
Jersey City	750,000	20	155	160
Laclede, St. Louis, Mo.	1,600,000	100	97	99
Louisville, Ky	1,500,000	50	118	121
Montreal, Canada	2,000,000	100	181	182½
New Haven, Conn		25	190	195
Oakland, Cal			35	35½
Peoples, Jersey City		—	25	30
" " Bonds			—	—
Paterson, N. J		25	90	—
Rochester, N. Y		50	75	80
St. Louis, Missouri	600,000	50	—	475
San Francisco Gas Co. San Francisco, Cal.	10,000,000	100	59	60
Memphis (Tenn.) Gas	750,000	100	80	82
" Bonds	240,000	100	103	—
Washington, D. C	2,000,000	20	190	—
Wilmington, Del		50	205	215
Havana (Cuba) Gas Co.	3,000,000	100	18	20
" Bonds	550,000		102	—

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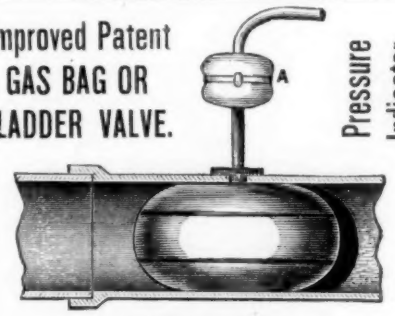

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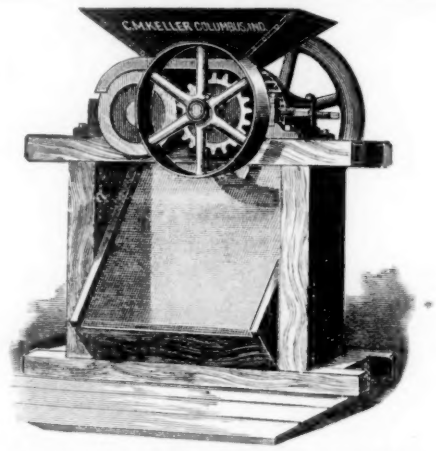

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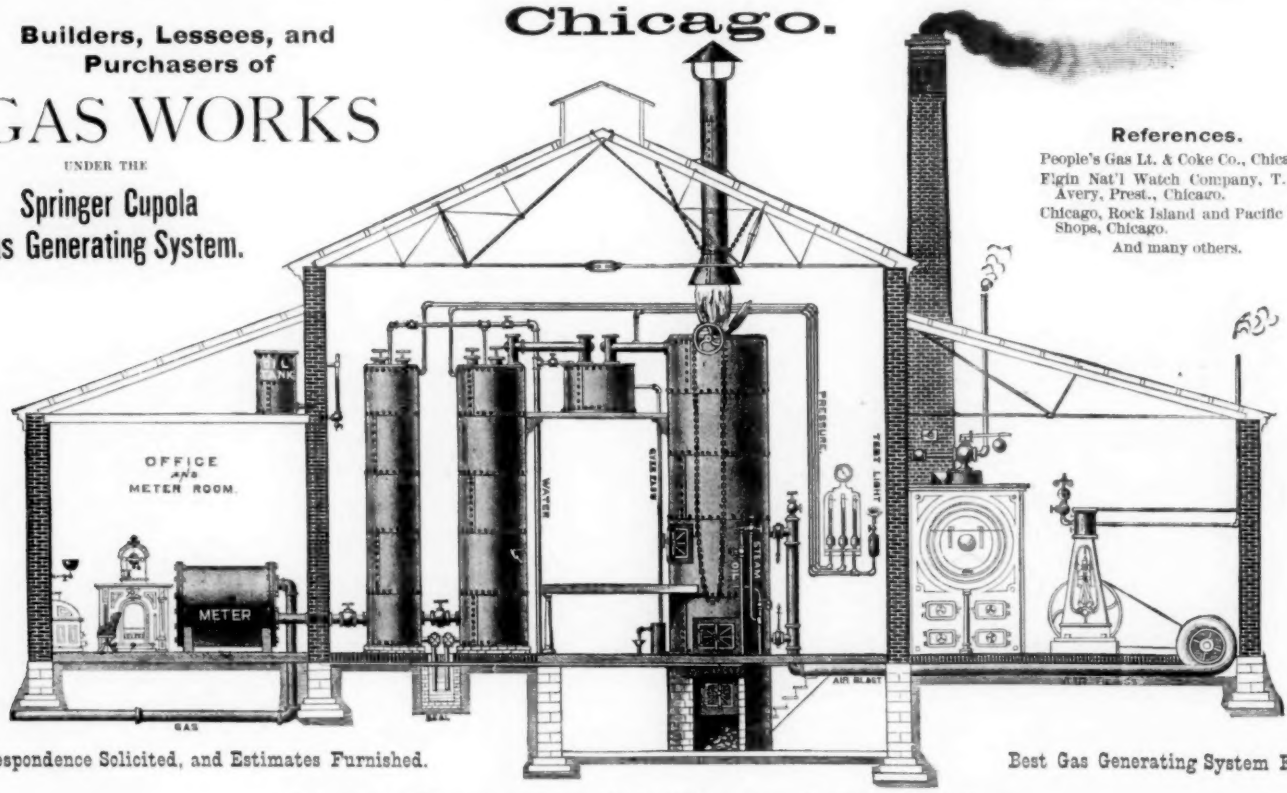

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Iron Sponge is now used by *over three hundred gas companies* in the United States, and is recognised as the *most efficient* and *economical* form of iron ever used for the purification of gas. Many persons confound "Iron Sponge" with the ordinary preparations of oxide, and call any nondescript mixture of iron turnings, etc., "Iron Sponge."

Iron Sponge is a distinct form of iron, obtained by treating oxides of iron in contact with carbon at a suitable heat, *with complete isolation from the atmosphere.* It retains the contour or shape of the ore, expanded in bulk, and with a marked loss of weight; is easily indented, and polishes quickly to a silvery lustre. It consists of the non-volatile matter of the raw ore; and its peculiar spongy texture is caused by the loss of the volatile matter, which, separating from the ore, leaves minute cells and spaces throughout its entire mass, whereby it is rendered *extremely sensitive to chemical action.* It can be used with *equal* satisfaction and economy on both coal and water gas. It is well known that works using *same lime and coal* will have vastly different results in amount of gas purified per bushel of lime, due to *limited purifying surface*, imperfect condensation and scrubbing, *permitting tar and oily vapors to enter purifiers*—conditions having equal effect on Iron Sponge.

The *saving* it will effect in any works (whether making coal or water gas) *will repay many times over the cost of securing the conditions most favorable to its use.* In most works a layer of sawdust on lower trays is all that is necessary to keep the Sponge *clean* until exhausted.

We invite attention to the following letters, and will publish others in later numbers of this Journal.

CONNELLY & CO., Ltd., 177 Broadway, N. Y.

CINCINNATI, O.—It affords me pleasure to state that we have been purifying with Iron Sponge in connection with lime in "check" purifiers for the past five years. The results are eminently satisfactory, and a reduction to one-third the former expense of purification. A. HICKENLOOPER, Prest.

CHICAGO, ILL.—Your Iron Sponge for gas purification has been used at the south station of this company during the past five years, and the results have been so satisfactory that we are now about to use it at the north station as well.
THEOBALD FORSTALL, Vice President.

COLUMBUS, O.—In reply to your letter of the 19th inst., I have used oxide of iron for purifying coal gas almost to the exclusion of other material during the past 18 years. The results have always been satisfactory respecting the complete elimination of sulphuretted hydrogen from the gas; and respecting cost of material and labor, I would say that the oxide of iron process of purification will cost not to exceed 25 per cent. of the cost of hydrate of lime purification. I regard the *Connelly Iron Sponge as the best form of oxide of iron* of which I have any knowledge.
E. McMILLIN, Engineer and General Manager.

CHARLESTON, S. C.—In answer to yours of the 16th inst., we would say that the thousand bushels of Sponge purchased from you in 1884 has been in constant use, and has had passed through it 105,000,000 cubic feet to date, and we are still using it. Owing to the *smallness* of our purifying surface, it has been rather hard worked. We will need a new supply soon. THOMAS TURNER, President.

FITCHBURG, MASS.—As I am changing the Iron Sponge bought of you over six years since for some new Sponge, and thinking you would be interested to know the results, would state the old lot of Sponge purified 67,561,800 feet of coal gas, or 180,000 feet to a bushel. H. F. COGGSHALL, Manager.

MACON, GA.—Your inquiry as to how I am pleased with the Iron Sponge after continued use has just reached me. I am free to say that after five years' use of Sponge I find no reason to change my first favorable impressions regarding it.
A. E. BOARDMAN, Supt. Gas and Water Works.

SANDUSKY, O.—In answer to inquiry regarding Iron Sponge, would say that we have used your material continually since April, 1884, and, with the exception of adding a little coarse sawdust to lighten it up, have used same material without further expense, and expect to do so for some time to come. *It has been a great advantage and saving to us over old method.* THOMAS WOOD, Supt.

CEDAR RAPIDS, IOWA.—We have been using your Iron Sponge for the past seven years with the *best of satisfaction*, and the cost of purification has not been *one-fourth the cost* while using lime. A. T. AVERILL, Prest.

ELGIN, ILL.—Replying to your inquiry as to satisfaction given by your Iron Sponge, will say we have used your purifying material for the past year with the best of results, and *perfect satisfaction as to economy, convenience, and quality of gas produced.*
M. H. THOMPSON, Sec. and Treas.

NORRISTOWN, PA.—For the purification of our water gas at the "Novelties" Exhibition, held in this city last October, we used your Iron Sponge with complete satisfaction. I believe it to be the best material for the purification of all gases containing large amounts of sulphur, and would recommend it as the most economical, and giving the least trouble, of any material I ever used. LOWE MFG. CO., by T. S. C. LOWE, Prest.

PITTSFIELD, MASS.—This company has used your Iron Sponge in the purification of coal gas for the last six years. We have used it because it was *much less expensive than lime*; and the reports of the State Gas Inspector show the gas made by this company to be fully up to the requirements of the law in freedom from sulphur and ammonia.
WM. R. PLUNKETT, Treas. Pittsfield Coal Gas Co.

LAWRENCE, MASS.—In answer to yours of the 16th inst., I would say we have used your Sponge at these works for several years, and are perfectly satisfied with the results obtained from it. C. J. R. HUMPHREYS, Agent.

EAST CAMBRIDGE, MASS.—We commenced the use of your Iron Sponge in March, 1885. In November and December we purified 11,000 feet per bushel. We have now passed 70,000,000 feet through the Sponge, and as yet it shows no indication of losing its efficiency. *Our saving on the labor account for the past 9 months is nearly* $500. H. A. ALLYN, Supt.

CADIZ, O.—We have been using your Sponge for five years with entire satisfaction, and at about *one-fourth the former cost* when we used lime for purification.
A. N. HAMMOND, Supt. Cadiz Gas Light Co.

SHARON, PA.—I have used your Iron Sponge for several years with very satisfactory results. It improves on acquaintance. It has proved *effective, economical, and cleanly* to work with. D. R. SHIRAS, Sec.

LOGAN, O.—In reply to yours of the 16th inst., we have been using the first lot of Iron Sponge received from you in August, 1884, constantly, and it is still in good condition, and, as far as I can judge, likely to last as long again. We have no desire to go back to purification by lime. A. MICHIE, Sec.

COLUMBUS, IND.—In reply to yours of the 16th, would say that we have been using Iron Sponge for two and a half years, and are perfectly pleased with it—it being *much cheaper than lime* and just as good. C. M. KELLER, Sec.

WILKES-BARRE, PA.—In reply to yours of the 18th, will say I commenced using your Iron Sponge October, 1885, and *prefer it to lime.* Do not have to change the boxes so often, and the back pressure is very much decreased. *I can recommend it for purification of water gas.* MARCUS SMITH, Supt.

LONG ISLAND CITY, N. Y.—The carload of Iron Sponge arrived in good condition. When ordering the trial lot I was a little in doubt as to the benefits to be derived from it in the purification of water gas. I have now abandoned lime as a means of purification, for the reason that on all accounts *the Sponge is preferable*, the labor and cost of material being largely reduced, and the comforts correspondingly increased. Instead of using sawdust, as directed by your circular, I put one tray at bottom six inches deep of old spent lime, and have allowed it to remain sixty days. It absorbs any oily matter that is carried mechanically past our condenser. C. A. KITTLE, General Manager.

HYDE PARK, ILLS.—We have used your Iron Sponge in our works since November last, and have found it very satisfactory. GEO. C. WILSON, Prest.

LOGANSPORT, IND.—In answer to yours of 16th, would say we have been using your Iron Sponge *for five years with very satisfactory results.*
LOGANSPORT GAS LT. AND COKE CO., E. S. RICE, General Manager.

SANTA ROSA, CAL.—We have been using Iron Sponge since August, 1881, and are *perfectly satisfied* with the results derived from its use as a purifying material.
E. A. SHACKELFORD, Supt.

MILWAUKEE, WIS.—We have had your Iron Sponge in use for the past three months, and prefer it to any other purifying material we have ever used.
ED. G. COWDERY, Supt.

PAINESVILLE, O.—We have used your Iron Sponge for the past two years, and shall continue to use it. *It gives perfect satisfaction.*
J. W. ALEXANDER, Prest. and Manager.

COVINGTON, KY.—Replying to yours of the 28th, I would say that we have been using your Iron Sponge for six years. The last lot purchased of you three years ago is still in use and giving good satisfaction. You could not induce us to return to the use of lime. RICHARD SALTER, Supt.

WOOSTER, O.—We have used your Iron Sponge about eight months with entire satisfaction, and shall continue to use it as long as we can do so with the success we have had thus far. WOOSTER GAS LIGHT CO.

KENOSHA, WIS.—It gives us pleasure to add one more testimonial to the value of your Iron Sponge, received at first with some distrust, but now so far overcome as to make *its use indispensable*—the rule instead of the exception. J. H. KIMBALL, Prest.

NEWARK, N. J.—For more than a year past we have used your Iron Sponge, and regard it a very excellent and economical purifier. We are now using no other material for purifying our gas. A. A. SMALLEY, Prest. Citizens Gas Light Co.

QUINCY, MASS.—We most cheerfully and heartily recommend your Iron Sponge as being the best purifier of gas we have ever used or heard of. We purchased a supply over three years ago, and have used it constantly ever since to our entire satisfaction. Although our works are comparatively small, our saving during that time has amounted to thousands of dollars—a fact which in itself speaks volumes of praise.
N. J. McNEIL, Supt.

OHIO PENITENTIARY.—In reply to yours of the 28th inst., I take pleasure in saying that the Iron Sponge bought of you two years ago, and which has been in constant use ever since, has given entire satisfaction. It does all you claim for it; in fact it reduces the cost of purification to almost nothing—which certainly ought to be satisfactory. R. P. GREEN, Supt.

MURFREESBORO, TENN.—I have been using your Iron Sponge since Oct. 1, 1884, and am well convinced that it is *a good and efficient purifying material.* It is much cleaner to handle and costs less than lime. CARROLL COLLINS.

ATHENS, GA.—Replying to your favor of the 28th inst., we have been using Iron Sponge for a year and a half, at first rather suspiciously, but latterly to the complete exclusion of lime—so thoroughly satisfactory has the cleaner purifier proved itself. It is equally as effective as lime, and at the same time makes a neat purifier room possible.
C. D. FLANIGEN, Agent.

NORTH ATTLEBORO, MASS.—Replying to your letter of Jan. 28th, would say that we commenced using your Iron Sponge April 14, 1884, from which time to the present, with the assistance of one lime purifier, we have purified on an average of 7,000 cubic feet per bushel. I am very much pleased; for besides reducing the cost of purification about one-half, it removes effectually what we have previously been unable to take care of at our works—*ammonia.* E. G. PRATT, Supt.

RACINE, WIS.—Yours of the 28th to hand. I commenced to use your Iron Sponge in November, 1882. We purified 3,000 feet to the bushel the first month. May, July, and September of same year we purified 20,212, 17,462, and 23,937 cubic feet per bushel respectively. Our average for 1883 was 15,613 feet per bushel; and for 1884 was 9,058 feet per bushel. In May, 1885, we threw away the old Sponge and started on 480 bushels of new Sponge. Our average purification for 1885 was 5,478 cubic feet per bushel. We estimate that it costs us half a cent per 1,000 feet (including labor) for purification with Sponge.
JOHN RODGERS, Supt.

LIMA, O.—We have used your Iron Sponge for two years—nothing else—and are entirely satisfied with it. LIMA GAS LIGHT CO.

PORTSMOUTH, O.—Yours of 16th to hand. In reply would state that we have been using your Iron Sponge since April 1st, 1884, and so far *it has given entire satisfaction*; and we have had no occasion to renew since first using the same.
J. WARREN SMITH, Sec.

LYNN, MASS.—In reply to yours of Jan. 16th, would say that we have used your Iron Sponge for a number of years with *economical results.*
CHAS. F. PRICHARD, Supt.

NEW CASTLE, PA.—We have been using Iron Sponge for eight years, with good results—giving us entire satisfaction. We are still using the last lot we got in 1883.
LAWRENCE GAS CO.

MANSFIELD, O.—Our company has been using your Sponge for two years in our works for purifying, and it has been very satisfactory. We would not know how to get along without its use. G. S. HARRIS, Supt.

HAMILTON, O.—We have been using your Iron Sponge the past five years exclusively, using no lime with it; and it affords us pleasure to testify to its merits. Our present lot has been in use now over 16 months. D. H. HENSLEY, Sec.

WATERTOWN, N. Y.—Yours of Jan. 16th just received, and in answer would state that we have used Iron Sponge exclusively since the last of April, 1882, and are *entirely satisfied* with it. Our gas is well purified, the labor is very much less than with lime, and our candle power averages 18, using coal alone. JOS. S. GREEN, Sec.

EUFAULA, ALA.—We have been using your Iron Sponge for some months. It gives us satisfaction in purifying gas, and is decidedly cheaper than any other process we have used. JOHN W. TULLIS, Prest.

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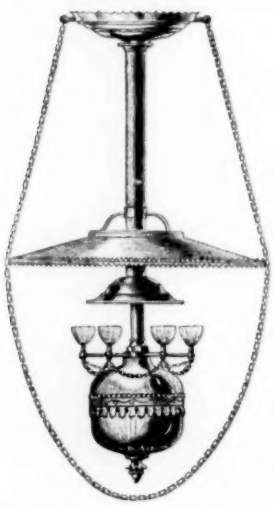

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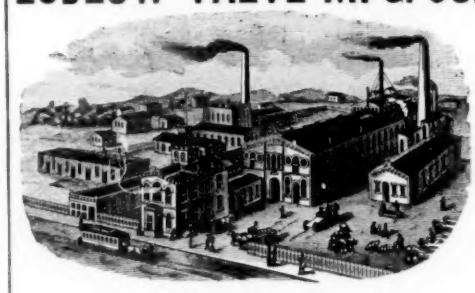

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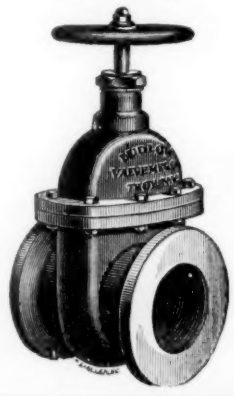

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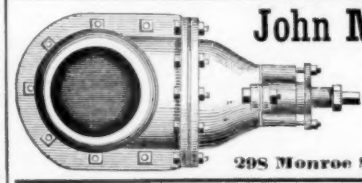

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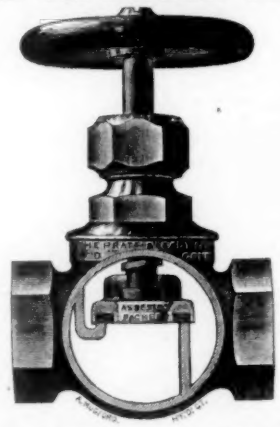

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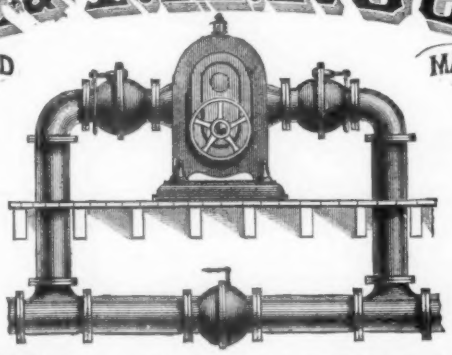

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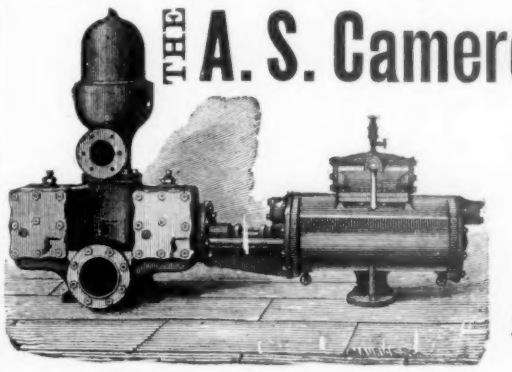

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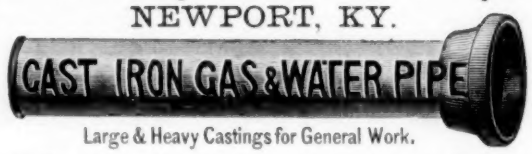

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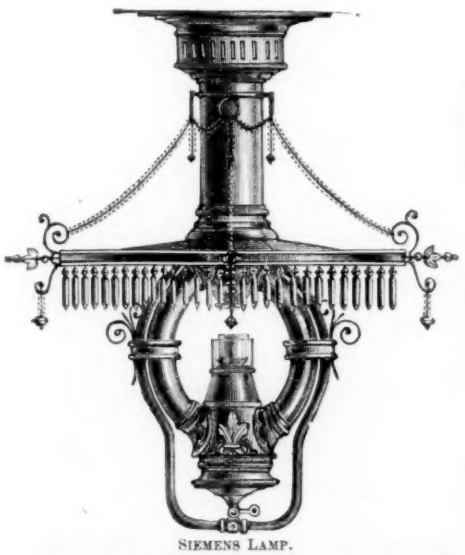

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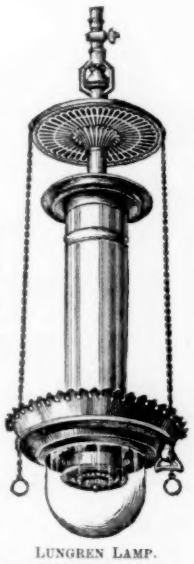

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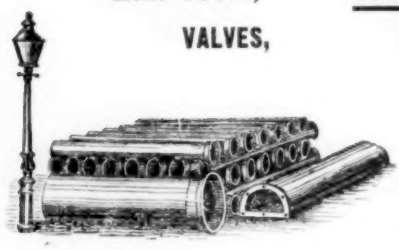

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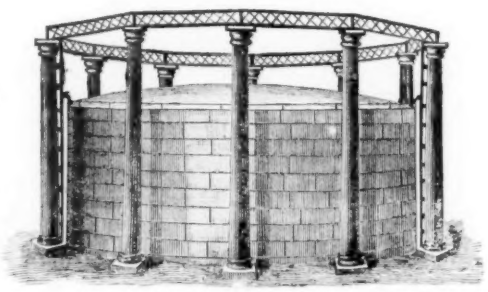

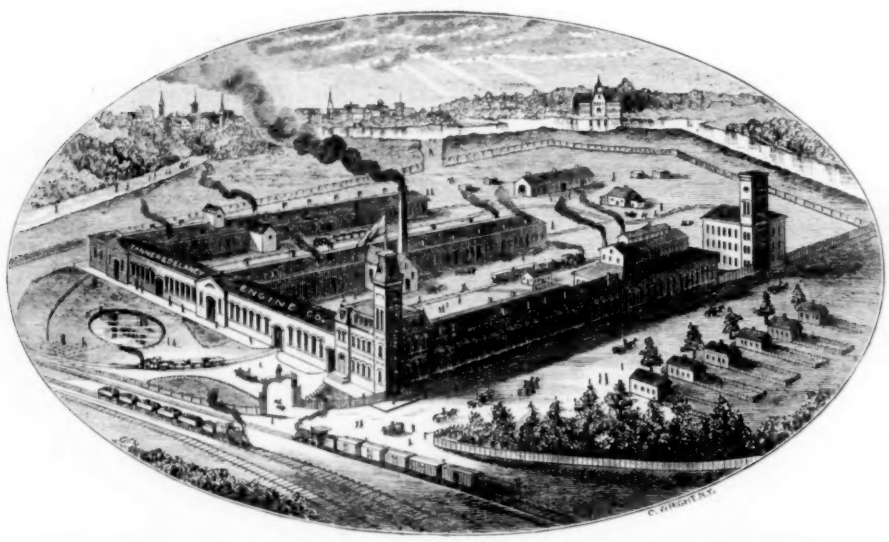

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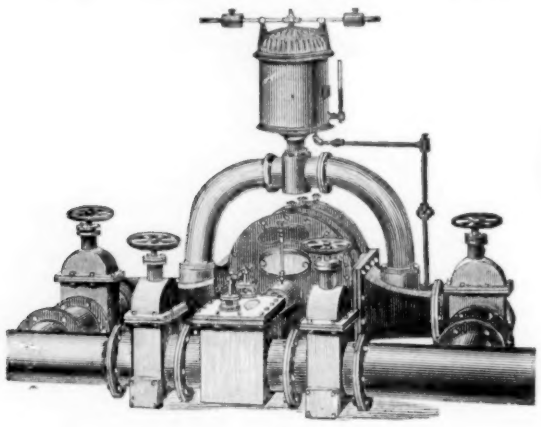

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Ypsilanti, Mich	"	25,000	"
Muskegon, "	"	70,000	"
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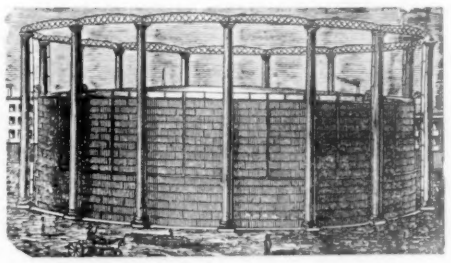

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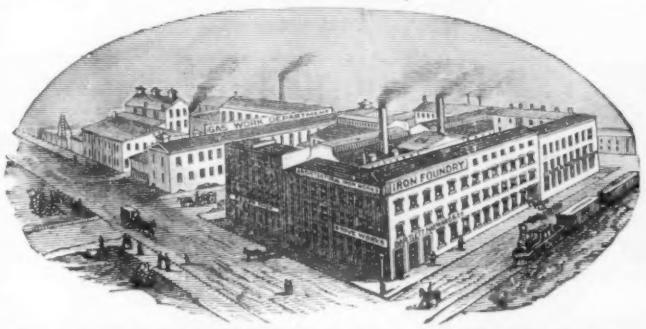

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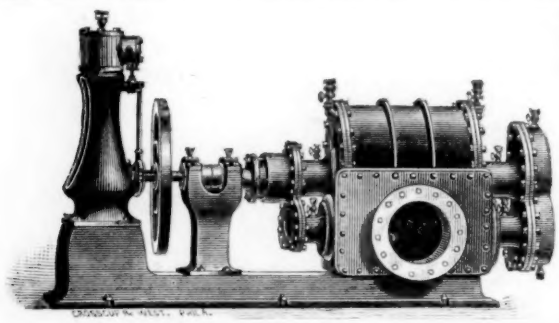

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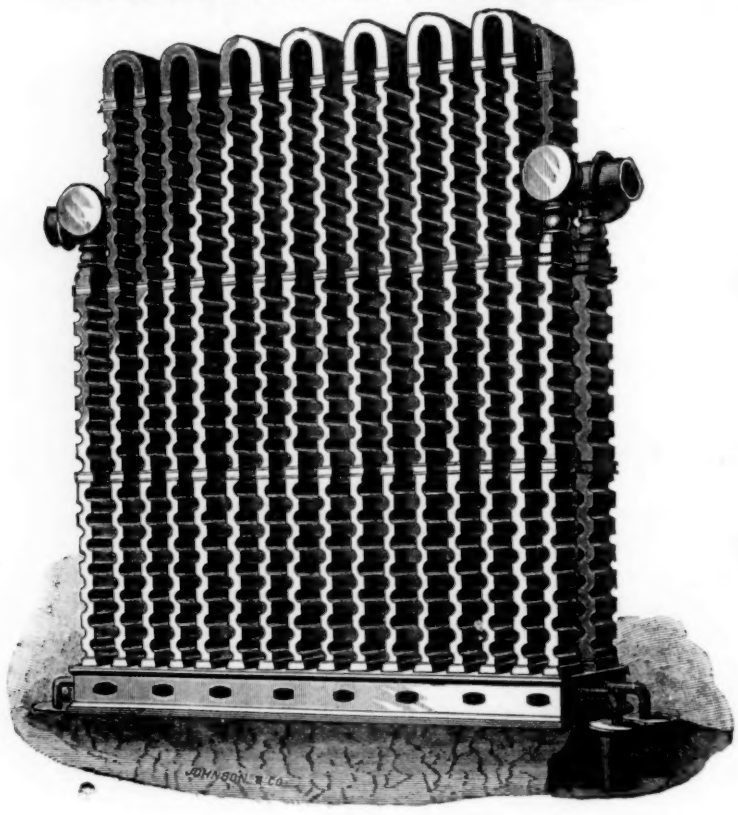

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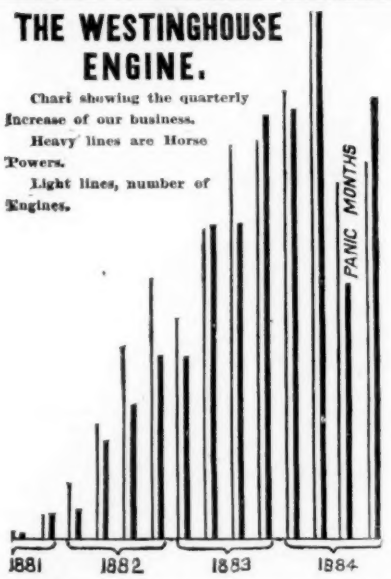

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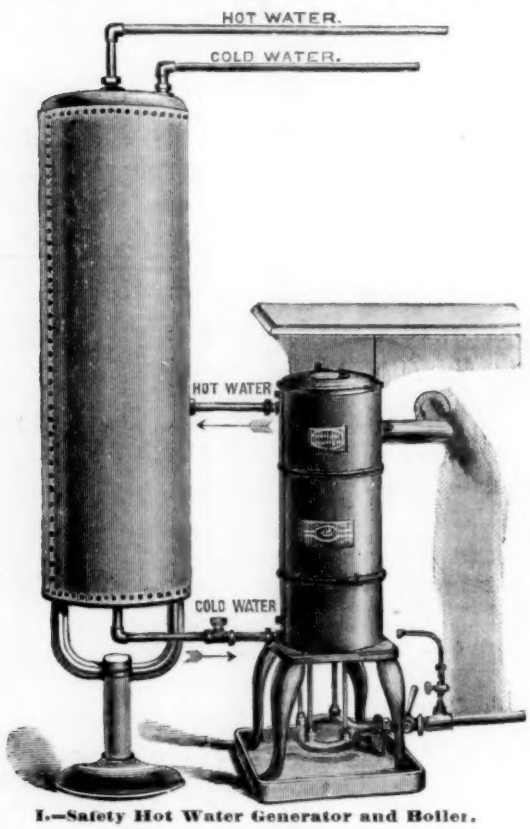

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We beg to call attention to the cast iron pan which is now attached to the legs of the Generator (see illustration). This is to catch the drippings from the Coil, which many persons suppose come from a leak, when in fact they are produced by condensation. This condensation is cause by he hot flame coming in contact with the coil filed with cold water.

New Style Gas Cooking Stove.

Cut II. represents our New Style Cooking Stove. As will be seen, it has an ornamented cast iron base and front, and extension shelves. The oven burner, which is atmospheric (unless otherwise ordered), is of an entirely new and improved pattern (patent applied for). The ovens are of greater capacity than those of the old style. The top, in conjunction with the outlet pipe, is designed to carry off all products of combustion; hence the outlet pipe must be connected with a flue, or the stove will not work properly.

This Stove has 4 boiling burners in top of hot plate. All fittings are nickel plated. We are making this style of Cooking Stove in the following sizes—viz., No. 7 B, No. 8 B, No. 9 B, and No. 10 B.

III.—Improved Hot Plate, No. 108.

New Style Hot Plates.

Cut III. represents our New Style of Hot Plates, of which we are making No. 106 (two small boiling burners), No. 107 (two medium sized boiling burners), and No. 108 (two medium and one large boiling burner). See new Catalogue and Price List for further particulars.